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REPORTS

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FISHERIES INVESTIGATIONS

IN

HUDSON AND JAMES BAYS AND TRIBUTARY
WATERS

IN

1914

BY

C. D. MELVILL

A. R. M. LOWER

AND

NAP. A. COMEAU

DEPARTMENT OF THE NAVAL SERVICE

APPENDIX

TO THE ANNUAL REPORT OF THE DEPARTMENT OF THE NAVAL SERVICE
FOR THE FISCAL YEAR ENDING MARCH 31, 1914.



OTTAWA.

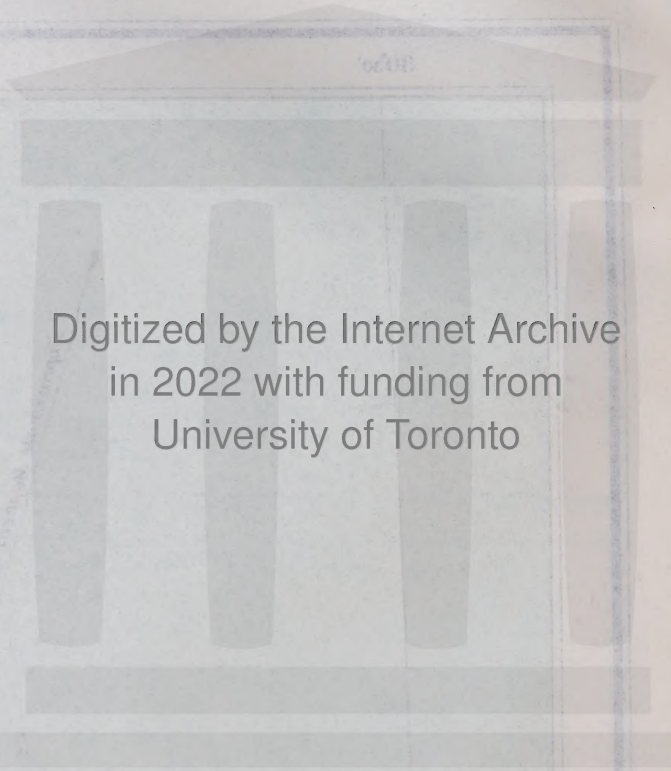
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1915

[No. 39a—1915]







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SESSIONAL PAPER No. 39a

A. 1915

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REPORT
ON THE
EAST-COASTAL FISHERIES OF JAMES BAY.

BY
C. D. MELVILL, F. R. G. S.

OTTAWA, October 20, 1914.

To the Deputy Minister,
of the Naval Service,
Ottawa, Ont.

SIR,—I beg to submit my report on investigations undertaken during the summer and fall of 1914 into the Fisheries of the South and East Coasts of James Bay.

In submitting this report I desire to acknowledge the hospitality and kind consideration shown me by the officers of both the Hudson Bay Company and Messrs. Revillon Frères Trading Company. The help and information given also by these companies greatly assisted the expedition.

I have the honour to remain, sir,
Your obedient servant,

C. D. MELVILL.

INSTRUCTIONS RECEIVED FROM THE DEPARTMENT.

This report is the result of investigations undertaken during the summer of 1914 into the value of the commercial fisheries of the South and East Coastal Waters of James bay, and as far as possible the tributary waters.

The full instructions received from the Department of Marine and Fisheries being as follow:—

To proceed by canoe by the most feasible route to Moose Factory (a Hudson Bay Company trading post on James bay) thence around the coast as far north as Cape Jones (54° Lat.) the northeastern limit of James bay, obtaining as far as possible information on the following points:—

- (1) To ascertain the different kinds of food fish to be found in the bay and its tributary waters; and the extent of each kind of fishery;
- (2) To ascertain the period of time of the runs of anadromous fish;
- (3) Keeping in view local conditions, to report on the most feasible methods of catching the various kinds of fish, and what regulations should be adopted for their conservation, should commercial fishing be undertaken;
- (4) As far as possible, to obtain all information regarding the spawning areas available in the upper reaches of the rivers for the different kinds of fish;
- (5) To investigate the conditions of climate and all local influences relative to their affecting the value of the fisheries;

ITINERARY.

In accordance with the instructions received from the department, in company with Mr. A. M. Lower, I left Ottawa for Cochrane on the evening of June 4. The canoe-men engaged for the expedition (Messrs. Duncan McNab and Angus Chevrier) had previously been instructed to meet me at Haileybury.

Three days were spent at Cochrane, outfitting and waiting for the National Transcontinental Railway construction train on which we were able to obtain passage to Missanaibie.

Leaving Cochrane on June 9, we reached the Missanaibie river that evening and at once loaded up the canoe and went a few miles down the river. The river being very low for the time of year, great care had to be exercised at the numerous rapids, which with higher water would have been drowned out. In all six portages (four short and two long) were made between Missanaibie and tide water.

On June 18 the junction of the Mattagami and Missanaibie rivers was passed, the river hereafter being known as the Moose. On June 20 we reached Moose Factory, the headquarter post of both the Hudson Bay Company and Messrs. Revillon Frères Trading Company in James bay.

We left Moose Factory for Charleton island on June 25 in the small steamer *Innu*, being indebted to Mr. F. D. Wilson, District Manager of the Hudson Bay Company, for his kindness in giving us passage. Charleton was reached on the afternoon of June 26, after a very cold miserable passage. Three days were spent at Charleton island, thence we proceeded to Rupert's House (45 miles south). Leaving Rupert's House on July 2, we arrived at Sherriek mountain* on July 3, and East

* Elevation about 700 feet, a conspicuous landmark, being the highest hill or mountain around James bay.

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Main Fort on July 6. Stormy weather delaying us two days, it was not until July 9 we could start for Fort George, accompanied by three Indian families in four canoes, and by a large canoe belonging to Mr. W. G. Todd, of Pittsburg, U.S.A., who was making a collection of the birds of James bay.

We reached Fort George (Big river) on July 15. Bad weather again delaying us, we were unable to leave before July 19. On July 23 we arrived at Cape Jones, after three very cold and wet days' travel. Three days were spent at Cape Jones near the Indian and Eskimo camps and some valuable information was obtained regarding the so-called Arctic salmon. We were fortunate in catching a few of these fish, although the natives stated it was yet too early for them in any quantity.

Leaving Cape Jones (the northern limit for the expedition according to my instructions from the department) on July 27, we arrived at Kakashewan point on July 28, and Brandy bay the following day. Bad weather delayed us here one day, but this delay enabled us to make an excellent whitefish fishery. Fort George was reached on July 31.

Arrangements were here made with Messrs. Revillon Frères for the hire of the small schooner *Violet* for a trip to the North Twin island.

Leaving Fort George on August 5, stormy weather repeatedly prevented us beating out into the bay and making the 65-mile crossing, so that it was not until August 12 that we reached the island, but meanwhile a few days had been spent at Long Point, Eskimo Duck islands and other places, which proved excellent fishing grounds.

We returned to Fort George on August 15; since my instructions were to return to Ottawa about the beginning of October, I considered it nearly time to commence our long return journey south. On August 17 we left Fort George, arriving at East Main on August 27, after many days of northwest gales and foggy weather in which we were unable to travel.

Rupert's House was reached on September 1, and here bad weather again stopped us until the 6. On September 8 we camped near the mouth of the Nottaway river and Sawayan point on September 10.

After experiencing some difficulty in Hannah bay through our ignorance of the tides, we reached the Harricanaw river on September 13 and West river September 15. Thence travelling day and night we eventually arrived at Moose Factory on September 17 and here heard the first news of the European war.

A week was spent at Moose fishing and obtaining such information as was possible regarding the fisheries in the neighbourhood.

Leaving Moose on September 24, and travelling by the Mattagami and Ground Hog rivers we reached the railroad on October 7, and Cochrane on the 8. The water in the rivers was extremely low, causing us to wade and drag the canoe in many places for over a mile, thus travelling was very slow.

At Cochrane I at once paid off the men, and after settling up all other accounts returned to Ottawa as soon as possible.

The expedition travelled (measured from the railroad back to the railroad) about 1,400 miles. The weather on the whole was very cold and wet; the last two weeks, however, were fairly fine, the few days spent on the Moose river seeming very hot after the cold winds of the bay.

The canoe, fishing nets and other gear provided by the department were satisfactory. I would also like to add that the two canoeemen, Duncan McNab and Angus Chevrier, performed all necessary work most efficiently.

DESCRIPTION OF THE SOUTHERN AND EASTERN SHORES OF JAMES BAY.

James bay is that portion of Hudson bay lying south of a line drawn from Cape Henrietta Maria on the west to Cape Jones on the east coast. From the most southerly point in Hannah bay the distance due north to a line drawn between the two capes.

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is, roughly, 300 miles, while the average breadth of the bay is 145 miles. The area, therefore, of the whole bay is very considerably greater than that of lake Superior.

From the mouth of Moose river to Rupert's bay, the general coast line is very low and flat, with extremely shallow water, deepening slowly from the shore seawards. On the southern shore at low water only mud flats covered with large and small boulders can be seen looking seawards. The shore is in most places marshy, covered with grasses, alders and willows, with numerous brackish pools for a considerable distance from high water mark; in fact, in many places it is difficult to say where the land begins and the sea ends, or vice versa. Beyond, on higher ground, is the usual forest growth of spruce, tamarack and poplar.

Situated between the Moose and Rupert's rivers, Hannah bay is so shallow that with the exception of the channels of the Harricanaw and West rivers, the whole bay is practically dry at low water. When a boat or canoe is left by the tide, as very often occurs, the thoughts and language of the crew can be better imagined than expressed, as they wait, perhaps out of sight of the low-lying shore line, for the return of the water to float them off.

On the east side of the bay (north of Sherrick mountain) the character of the coast changes considerably, the low marshy shores giving place to a rocky, sandy coast line fringed with innumerable islands of all sizes from a mere pile of boulders to islands some thousands of acres in area.

The water becomes very much deeper and the landing from a small boat at low tide, impossible on the south coast except at the expense of a walk through two or three miles of mud and clay, becomes easy.

Navigation is comparatively easy, although many shoals and hidden boulders are present. The waters can be safely navigated by small craft, the islands and bays affording excellent shelter, the only danger perhaps for canoes when running from island to island is being caught in a heavy squall. This danger can, of course, be considerably reduced by a proper knowledge of the local weather conditions.

The country inland from the east coast appears to consist mostly of swampland although along the rivers the soil is good. Further inland the country gradually changes to a rough plateau gradually rising to over 2,000 feet above the sea level. I cannot describe the country better than by quoting Mr. A. P. Low, of the Geological Survey, who explored this country in the summer of 1887. Mr. Low says, "The edge of the tableland leaves the coast to the north of Cape Jones and runs in a SSE. direction so that to the southward there is an interval varying from 10 to 30 miles between it and the coast. In this portion the general level is not much over 100 feet above the sea, and the soil is of post-pliocene clays and sands with alluvium, affording good land for cultivation, but as the climate is colder than on the west side it is doubtful if it will allow the successful growth of any but the hardiest cereals; good crops of potatoes, however, and other roots could be and are grown as far north as the mouth of Big river (Lat. 53° 50')."

Rivers.

Eleven large rivers and numerous smaller ones flow into James bay on the south and east coasts, the principal being the Moose (which is composed of the Abitibi, Mattagami, Missanaibie rivers and other smaller although important tributaries), West, Harricanaw, Broadback, Rupert's, East Main, Old Factory, Big, Bishop Roggan and Seal rivers. Bishop Roggan is not, as might be supposed, the name of some enterprising missionary, but is the more interesting, from the point of view of this expedition, as this word is the English corruption of the Cree Indian word "Peshipwaytok", meaning Fish Weir. It was on this river that the Indians in former days made basket weirs from willows for catching fish as they descended the stream.

All the rivers flowing into the south and east coasts of James bay are swift and very much broken by falls, rapids and shallows and are without exception only fit for canoes or boats of very shallow draught; the chief characteristic of them all being the great width of their beds in comparison to the amount of water to be carried. After the ice leaves the rivers and during the fall rains high water covers for a short period all or a great many of these obstructions so that navigation with larger boats might be feasible. During this summer (1914) so shallow was the Abitibi river that the Hudson Bay Company was unable to send a loaded canoe from Moose Factory to their trading post (situated some 100 miles from the junction of the Abitibi and Moose rivers).

Lakes.

The principal lakes in this district under review are as follow: Mesakami lake situated at the head of West river, Nemiskau lake on Rupert's river, Sherrick Mountain lakes, Wabstaka and Opinaka lakes on tributaries of the East Main river, and White Fish lakes on Salmon river (near Cape Jones).

None of these lakes are of a large size, Nemiskau, probably the largest, being a narrow, irregular shaped body of water about 30 miles long, but only 3 or 4 in breadth. This lake is spoken of by the Indians as being by far the best fishing lake in that part of the country; this report is borne out by its name ("Nemis"—Cree Indian for "fish"). It is situated 100 miles from Rupert's House and, roughly, 180 miles north of the National Transcontinental railroad. Should a railroad ever be built north from the National Transcontinental railroad to Rupert's bay, this lake, and others further south—such as lake Evans on the Broadback and lake Mattagami on the Nottaway river—would prove of value for commercial fishing provided the railway passed sufficiently near. The expedition had no time to visit these lakes; indeed, under present conditions a full summer would be required to reach them and properly investigate their fisheries.

Harbours.

The question of harbours relative to the fishing grounds is an important one. At the present time the Hydrographic Survey, under Mr. Jobin, are doing very considerable work in James bay sounding and surveying the natural harbours and river mouths. The current of all the rivers brings down such a great quantity of sediment that shoals and bars almost completely block the estuaries except for narrow channels in each.

At Moose River Roads the Hudson Bay Company's ship, drawing about 16 feet of water, used to anchor in what is called Ship-Hole, some 8 miles from Moose Factory, and there discharge her cargo into barges sent from the factory for this purpose. The 8 miles of estuary (from Ship-Hole to the Factory) is very shallow, so much so that it is only with the greatest care the company's small steamer *Inninu* can approach the latter place. The last few years, however, the annual ship has discharged her entire cargo at Charleton island, and this is now her only port of call in James bay. Strutton island, some 7 miles north of Charleton, is the distributing centre for Messrs. Revillon Frères, the only other fur traders in the bay. The goods for the various posts are distributed by small steamers and by schooners (sent from the various out-posts).

Although Moose Factory is no longer the principal port of the bay, it must undoubtedly be considered the capital. The inhabitants around the coast and in the interior looking on a trip to Moose in much the same light as the country people in civilized life consider a visit to their largest city. It may be one of the events of a life time.

Moose Factory is built on an island and has a beautiful site overlooking Moose river. The mission church, school, the large and numerous warehouses and dwelling

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houses of the Hudson Bay Company all whitewashed and arranged in symmetrical order, and the field cannon underneath the flag-staff all combine to make the place in some small degree resemble a government or even a military institution, at any rate from a distance. A closer inspection, however, of the average inhabitant will very quickly dispel any illusion of this kind, he is anything but martial in appearance or manner.

The Ontario Government have recently been exploring the mouth of Moose river with a view to the further extension of the Temiskaming and North Ontario railway to James bay. Whether this project has been abandoned or merely temporarily postponed, I am unable to say.

It would seem that the cost of a railroad to the mouth of Moose river, the last few miles of which would have to be built on an embankment in practically the open sea and exposed to all northerly storms, would be enormously expensive out of all proportion to any possible source of revenue. This remark applies also to Rupert's river; but Savayan point, the peninsula which separates Hannah and Rupert bay, having deep water at low water might be made into an excellent harbour by the building of a breakwater, which would be considerably less expensive than the construction of an embankment at Moose or Rupert rivers. The large bay immediately north of Sherrick mountain (called Boatswain bay on the map) would also appear to be a natural harbour which with a comparatively small expenditure could be made into a very fair anchorage. The mouth of Big river is probably the best harbour in the bay and with a little dredging would provide good anchorage for large ships. Four miles north of Big river is Stromness harbour formed by two or three islands. This being sheltered on all sides, and having plenty of water makes an excellent anchorage. Sabaskunika and Old Factory bays will also probably prove good harbours for fishing vessels, if not for larger ships.

Islands.

The largest island of the south and east coast, but the second largest in the bay (Agumiski island on the west being the largest) is Charleton. This island is about 18 to 20 miles long and 9 in breadth, and is situated some 125 miles northeast of Moose Factory, and 45 miles north of Rupert's House. The formation of this island, the North and South Twins, the Struttons, and other islands lying between Charleton and the Twins, is what is geologically known as "Drift", being composed wholly of sand, clay and boulders with no rock "in place." The forest growth of the island is mostly small spruce with a few birch and poplar. Numerous lakes full of speckled trout are found in the interior. The Hudson Bay Company, in 1846, introduced some beaver and a few are still to be found. This probably was the first fur farm established in Canada. This year, I believe, a fox farm is to be started.

The narrow straits between Danby and Charleton islands do not freeze in winter owing to the strong current (about 5 knots at the first of the ebb or flood). Owing to this fact numerous vessels have wintered here. Early in the history of the Hudson Bay Company this island was used as a depot for the distribution of their goods, but was abandoned for nearly 250 years. A year or so ago the annual ship made this again the only port of call. The Hudson Bay Company's buildings consist of a large warehouse, two dwelling houses and a small wharf; a wreck of a Norwegian three-masted schooner completes the rather lonely scene.

Besides Charleton, the only other of the outer group of islands I visited was the North Twin. This is the largest of four islands situated some 60 or 70 miles west of East Main river, the other three being the South Twin, Walter and Spencer islands. For the trip to this island (being too far to make in a canoe) I hired at Fort George a small 10-ton schooner belonging to Messrs. Revillon Frères. Only one or two of the oldest natives at the Fort had ever been to the island and their trip had ended in disaster, the sailing boat being wrecked on a reef close to their destination; they them-

selves having the unpleasant experience of having to return to the mainland in a birch bark canoe. As pilot, I had an old Indian named Matthew, who had been one of the wrecked crew already mentioned; together with three others and my two men we had what Matthew considered sufficient crew for this small boat; in reality two men ought to have been able to take her anywhere.

Delayed by bad weather we were seven days reaching the island. Seen some distance away the North Twin looms very high, though in reality the whole island is only about 100 feet above sea level; the cliffs, which from the sea look most precipitous, being only 30 or 40 feet high.

The harbour in which we dropped anchor is a deep crescent-shaped bay exposed to all north or east winds and is an unsafe anchorage with poor holding ground, the bottom being sand; a reef of rocks extending from the southern point of the bay gives some protection from southeasterly winds.

The island near the shore line is very marshy, with small shallow lakes filling all the depressions. Inland, at a higher elevation, the ground is covered with arctic plants; no trees growing on the island except a few small stunted spruce close to the harbour. This group of islands is a favourite breeding ground of the Canada Goose and there were hundreds of these birds to be seen in a moulting state at the time of our visit. The island is sometimes visited by Polar bears after a heavy storm, according to the report of an Eskimo family who have wintered there. Seals abound in the waters between the Walter and North Twin islands, and from the presence in such quantities of these animals, hopes were not unreasonably entertained that fish would prove to be also plentiful. Except for some tullibee we caught nothing. Perhaps if time could have been spared for a lengthy stay we might have been more successful.

The second group of islands can best be described as a maze of islands extending from Sherrick mountain to Cape Jones. Those in this group are composed of rock or boulders, the more southerly situated being heavily timbered while those north of Cape Hope, generally barren of trees, are covered with mosses and arctic plants. They are of no great elevation above the sea; Cape Hope island and Wastikun, two well-known landmarks, which loom high seen from a distance, are in reality only 200 feet or so above sea level.

It would be difficult to find the boat channel through this labyrinth of islands without a pilot, although the Indians have, it is true, set up tree logs and cairns at frequent intervals along the route. But the turns and twists in the channel are crooked and many, in addition to the fact that on these barren islands the natives have a habit of erecting upright poles on which traps are placed for the capture of the Snowy Owl, a bird which they consider a highly esteemed delicacy.

Climate.

The climate of the south and east coasts of James bay may be divided into two zones; the first, which may be said to extend from the south shore as far north as Big river, can be described as temperate. The second, from Big river northwards, as sub-arctic, or certainly cold temperate.

The climate with regard to fishery conditions alone matters only in so far as the freezing up of the waters may stop or impede fishing. Information on this was obtained from the white residents and natives.

Generally speaking, it would seem that the southern rivers are free of ice about the beginning of May, and about two weeks later in the bay itself there is a channel between the main body of the ice and the shore.

On the east coast the rivers open a little later than on the south, and the islands are free enough of ice to permit of fishing about the middle of June.

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Navigation on the bay commences about June 20, the date depending largely on the wind. The prevailing wind being northwesterly it is apt to drive large quantities of ice into the southern extremities of the bay.

As a matter of fact it is difficult to state with any degree of accuracy at what date the bay as a whole can be navigated. It is really entirely a question of the wind. The northern part is generally full of ice until the end of July and, I believe, the Hudson Bay Company's steamer *Innu* rarely attempts going to the Whale River Post until August. This summer the Whale River schooner was unable to leave the river mouth until August owing to the ice completely blocking the channel.

The southern rivers freeze up about November 20, those on the east coast a few days earlier; James bay itself is not frozen sufficiently to bear sled-travel until about Christmas. The ice is said to reach a thickness of over four feet. It is probable however, that the centre of the bay never freezes at all.

The temperature of the sea water taken at various places is given below with the date and place of observation:—

Cape Jones	July 27	40°F.
Twin islands	August 12	45°F.
Sabaskunika bay.....	" 24	50°F.
Factory bay	" 26	50°F.
Cape Hope	" 27	52°F.
Boatswain bay.....	" 30	54°F.
Mouth of Moose river.....	September 16.....	62°F.

In all cases the temperature was taken some 2 to 4 miles from the mainland (except at the Twin islands). The main body of water, undoubtedly, has a low temperature, possibly below 45° F. The comparatively higher temperature found around the coast being on account of the numerous rivers and the general shallowness of the water. I believe the greatest depth of the bay is only about 65 fathoms.

This large body of cold water exercises a very unfavourable influence for agriculture, although excellent potatoes and other vegetables are grown at Moose Factory, Rupert's House and as far north as Fort George on Big river. Oats and barley can be grown at Rupert's House and Moose Factory, and there is an abundance of wild hay in the neighbourhood of these places and also at East Main and Fort George. The cattle kept at all the posts appear to be in excellent condition. There is little doubt that further inland, away from the cold winds off the bay, surer crops could be raised. It is probable that this adverse climatic influence extends some 30 miles inland.

The soil appears to be mostly sandy loam, but very extensive draining would be necessary before farming operations on a large scale could be undertaken.

An instance showing the lateness of the arrival of spring, wild strawberries and other berries were found on the east coast to be ripe in the middle of August and the leaves of the poplars and willows were only just out at the beginning of July at Charleton island. This would compare unfavourably with the Mackenzie River country where at Lat. 65°, or nearly 900 miles further north, the leaves are all out about the middle of June, and wild strawberries and other berries are ripe at the end of July. On the other hand, winter sets in earlier in the Mackenzie basin than in James bay, but the drier and hotter summer (although shorter) of the former is far more favourable for the ripening of crops and the growing of garden produce than the latter. The same remark applies with more force still to the Peace River country, Northern Alberta (Lat. 58°).

Some people, too eager to "boom" and praise, have the hardihood to liken Hudson and James bays to the Mediterranean sea. Even on a brilliant summer's day a very vivid imagination is needed to compare these stormy northern waters to that genial southern sea; there is no point of resemblance anywhere.

But there is an European sea, the Baltic, the conditions of which are superficially at any rate very much akin to James bay. The rocky islands, low sandy coasts, shallow depth, comparative low range of tide, and the general climatic conditions common to both, all make points of close resemblance.

However, this statement is not meant to imply that warm and beautiful summer days do not occur; on the contrary, a glance at the Meteorological records at Moose Factory will show that 90° F. is no uncommon temperature in July or August.

Nevertheless, from our observations this summer, the conclusion arrived at was that the cold water and prevailing winds from the north retarded all growth to such an extent that the heat of a few fine summer days comes too late. Cold, fog and mist are common, and rain seems to fall unceasingly for days. Out of 83 days spent this summer on James bay, rain fell on 44, and 16 were foggy—the majority of which were foggy enough to stop travelling.

A warm sultry day generally brings up a sharp thunder-storm from the southward; the winds afterwards “backing” round to the north with great violence, and turning bitterly cold.

Heavy clouds in the south should always be a warning to canoes to avoid a long crossing, as a heavy squall very quickly raises a dangerous, choppy sea in the shallow waters of the bay.

In winter time the cold from December to the end of February is very severe (the thermometer not uncommonly recording 40° to 45° F. below zero).

The treeless coast and inland of the northeast are uninhabited at this season of the year except by a few Eskimo families. The Indians who live there during the summer retire to the more sheltered rivers and only venture back to set a few fox-traps, or in the early spring to catch cod.

Tides.

The rise and fall of the tide in James bay is about 5 feet, causing a current of about 3 knots per hour at the ebb and a little less at the flood. Considerable advantage is taken of the tide by the natives in making crossings from the mainland to the island, indeed they seldom start from camp except with a fair wind and tide in their favour.

In many places amongst the islands the current flowing through the numerous channels over a rocky uneven bottom makes with any wind a race which a canoe and small boat should be careful to avoid.

During the course of our stay in the bay it was impossible to make many observations on the influence of the tide on the movements of the fish. References are made elsewhere to such information as was obtainable.

Timber suitable for boat building.

The timber of James bay consists of spruce, tamarack, poplar and some birch, none of it of first-rate quality or of large size.

Messrs. Revillon Frères and the Hudson Bay Company import nearly all the timber which they at present use in the construction of their sail-boats, although in former days, I am informed, local timber was used.

On the construction of railroads to the bay and the development of the fisheries, it would seem that the boat and ship-building industries (which are closely allied to that of fishing) cannot depend on local timber for their needs.

Boats.

The Indian boat of James bay is the canoe, not now made of birch bark, but of wood (cedar or basswood) or more commonly of a cedar frame covered with a heavy canvas. Their dimensions are generally about 16 feet long and 18 to 20 inches in

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depth, and built with an extremely rockered keel, giving them when out of the water a very curious appearance. It is claimed that this design is superior to any other in rough, choppy water. One does not usually associate a canoe with a stormy northern sea, but owing to the shoal water of the bay and the scarcity of harbours for even shallow draught boats a large canoe is really a suitable craft for a coasting trip, and if fitted with a motor and centre-board would be very hard to excel.

The Indians in their canoes generally rig up a sprit-sail made of a blanket and with a fair breeze do not hesitate to make long crossings from island to island or point to point.

The Eskimo use the well-known "Kayak." In this little boat about 16 feet long by 30 inches wide, made of seal-skin or heavy canvas stretched on a wooden frame, these people make long sea passages (60 or 70 miles) to the outer islands.

The Hudson Bay Company have a number of half-decked, Ketch-rigged boats from 30 to 45 feet long and about 3 feet draught. They also have two or three schooners of about 20 tons for carrying freight from Charleton to the out-posts. These boats are well enough in a fair wind, but can make little way against a head wind and the short heavy sea in the bay.

Natives.

The Indians inhabiting the eastern and southern coasts of James bay are mostly Crees, and locally they are divided into two classes—the inlanders and the coasters. The inlanders seem to be the favourites with the trading companies, as they apparently travel far inland for their trapping, while the coasters spend most of their time fishing amongst the islands, hunting ducks and rabbits or begging from the trading companies.

These Indians have been in contact with British people for nearly 250 years, and for the last 50 years have had missionaries amongst them. They all, or nearly all, profess the Christian religion, and without exception all dress in cheap European clothes obtained from the traders. For a long time past they have obtained a high price for their furs and, in fact, so great has the competition been between the two trading companies, that they have been able to obtain large advances on the future prospects of their hunt, with the result that they are almost without exception well off. The present war will, no doubt, be temporarily destroying the markets for fur, cause the trading companies to entirely curtail this credit system.

With all these advantages it would be thought that these Indians would have the appearance of enjoying some prosperity, but the reverse is the case, a more hang-dog, miserable looking lot of people in the aggregate it would be impossible to conceive.

The Indians have practically undisputed ownership of the coast line as far north as Fort George, but beyond this point Eskimo are to be met, although they are not very numerous south of Cape Jones. One or two Eskimo families live on an island near Cape Hope, these being probably the most southerly representatives of their race.

The Eskimo can be described as a littoral people, inhabiting the bays and islands of the Arctic and sub-Arctic coasts. Of the two races (Indian and Eskimo) there can be no question of which is the more desirable from the point of view of an employer of labour; the Indian being, if not lazy, absolutely indifferent to time and quickly tiring of any work. They are also timid sailors in any large boat, that is in venturing far from land, and will only consent to go provided the total crew is double the number really necessary; a curious fact, since they would appear from the manner of handling their small canoes to be quite capable sailors.

The Eskimo, on the other hand, are a manly race, excellent seamen and will prove invaluable as fishermen. The Eskimo living as they do all the year round on the coast or islands are unable to make as large a fur catch as the Indian, with the result that they do not enjoy the same credit with the trading companies. They are, therefore, considerably poorer, but infinitely harder working, and in every way a more deserving people.

Nearly all travellers in the Arctic speak of the Eskimo in a kindly fashion. Captain Coates (elsewhere mentioned as the author of the book "Remarks on the Geography of Hudson's Bay") has many generous thoughts regarding these people. Although written over 150 years ago, the sentiments therein expressed so coincide with others of the present day that they seem worth while quoting. Captain Coates says, "It will be necessary before I quit these parts to set down my own sentiments and that of others in regard to the Usquemous, the natural inhabitants of all the northern borders of Hudson's bay and the streights which swarms with robust, hardy fellows fit for the severest exercise and, indeed, with such dispositions as if God's providence in fulness of time had prepared them to receive the yoke of civility. And I do assert of my own knowledge that these people are nothing near so savage as is represented by our early voyagers, and that their confidence is in their innocence, not in their numbers, which I have often experienced, when one or two has put themselves into my hand without reserve or caution." Elsewhere he describes them as, "bold, robust, hardy people, undaunted masculine men, no token of poverty or want, with great fat, flat, greasy faces, little black piercing eyes, good teeth, etc.", and he propounds a pious scheme whereby these tribes "may be made useful to us and acquire salvation to themselves."

The question of food supply is an important one for all natives living as the Indian and Eskimo do, by hunting and fishing. Fish there is no difficulty in getting, but meat is harder. Rabbits, ducks and geese are after fish their principal food. Caribou, which a few years ago were plentiful on the east coast on the barren islands and mainland, are now very scarce, while moose are unknown north of East Main river; the last named animal is probably migrating northwards, being driven back by the building of the National Transcontinental railroad. Judging by the numbers of moose seen on the Missanaibie and Mattagami rivers it would appear that about 100 miles north of the National Transcontinental railway is as good a moose country as there is anywhere in Canada. In the fall of the year the Indians kill large quantities of geese and ducks. The southern end of Hannah bay is notorious for its wild fowl; Snow Geese, Canada Geese Blue Geese (*Chen Coerulescens*) and many varieties of ducks gathering on the marshy plains in immense flocks and fattening on berries and grass seeds before the final flight south at the first touch of winter. To the natives from Rupert's House and Moose Factory the annual goose hunt in Hannah bay is an event of much importance.

With the comparative nearness of James bay to the outside world (220 miles from Moose Factory to the National Transcontinental railway) it would be supposed that some white men (prospectors and trappers) would have by this time penetrated to this by no means remote region; but this is not the case and there does not appear to be a single white inhabitant on the south and east coasts, except the officials of the two trading companies and the missionaries. This is remarkable, as in northern British Columbia and in the Canadian Arctic (in actual mileage far further from civilization and with greater difficulties of transport and, therefore, more expensive supplies) it is not uncommon to meet white trappers and prospectors.

All freight for the two trading companies is brought by ship to the bay, and although there are risks of navigation, goods and food supplies appear reasonably cheap.

Money is practically unknown among the natives, the companies pricing fur and goods on the basis of a value in what is locally called a "Made Beaver"; an arbitrary value having absolutely nothing to do with the skin of that animal. Thus a skin of a marten or fox is said to be worth so many "Made Beaver," against this a cotton shirt or one pound of tobacco is also valued at so many "Made Beaver." At Rupert's House there is still used the old brass coins or tokens representing one, a half, and a quarter "Made Beaver."

Historical.

While tradition has assigned to French fishermen the honour of first reaching Hudson bay about the year 1590, James bay was, undoubtedly, first discovered in 1610 by Henry Hudson on his third unsuccessful attempt to discover a route to China and the East Indies through the northwest passage.

Sailing through Hudson straits and bay, he, late in the year 1610, explored the southeastern shores of James bay, and eventually wintered in a small bay full of islands about Lat. 53°. (Probably Old Factory Bay.)

After spending a winter of great hardships, due principally to scurvy, he started to return, but his crew mutinying while off the mouth of Little Whale river (Hudson bay), cast him and his son and the few faithful sailors adrift in a small boat.

Hudson's ultimate fate and that of his companions is unknown, but it is probable that he survived for some time after reaching shore. Miserable though his end may have been, his name given to Hudson bay and straits and the Hudson river (New York) will live until the end of time. The mutineers eventually reached England with about half their number gone, the rest having been murdered by Eskimo on an island in Hudson straits.

While two or three northern expeditions left England during the succeeding years, it was not until 1631 that James bay was visited again. Captain James, outfitted by English merchants, sailed through Hudson straits and thence southward to Cape Henrietta Maria and eventually wintered at Charleton island. According to his story, he suffered great hardships from the extreme cold. He returned to England in the autumn of 1632, after having explored the southern and western shores of James bay.

The next expedition to the bay was for the purposes of trading with the natives. Two Frenchmen, Radisson and Groisselier, who had been trading with the Indians in the western interior, engaged some of them to act as guides to James bay. On their return in 1666 they endeavoured to induce some of the French fur traders of Quebec to outfit a trading expedition to the bay. Being unsuccessful they proceeded to Paris, but with no more success than they had met with in Canada. However, eventually they obtained an introduction to the English court, and armed with this they were successful in having a favourable hearing granted to them by Prince Rupert and a group of wealthy and influential men of London.

In 1668 the ship *Nonsuch* was outfitted and despatched to James bay under command of one, Zachariah Gilham,—Radisson and Groisselier accompanying the expedition. They passed safely through Hudson straits and sailed southward, eventually reaching Rupert river, which was then called the Nemiskau (Lat. 51° 30").

Here they built a trading post or fort, naming it Fort Charles, and after numerous friendly meetings with the natives returned to England the following summer.

In 1670 Prince Rupert, and others associated in this trading venture, obtained a charter from Charles II, styling themselves "The Governor and Company of Adventurers of England Trading into Hudson Bay."

In 1670 the Hudson Bay Company sent out Charles Bayley to establish a post at Rupert river. This post, known as Rupert's House, is the oldest post of the Hudson Bay Company, and is also therefore undoubtedly one of the very earliest British settlements in Canada.

In 1674, and succeeding years, the company gradually extended their trading operations, establishing posts at Moose, Albany and East Main rivers.

In 1693 war broke out between France and England. The French in Canada, the following year, sent a force overland (probably by way of Michicopoten and the Mis-sanaibie river) and took Albany, Moose and Rupert's posts.

In 1695 the company with the help of two ships of the English navy re-took these forts.

In 1697 the Treaty of Ryswick assigned only Fort Albany to the Hudson Bay Company. This was the condition of affairs until the Treaty of Utrecht in 1713. By this treaty, France ceded all her rights in the bay to England.

From 1713, until the present time, little change has happened to James bay.

Early in the 19th century the company established forts on the east coast at Big river (Fort George), and at other points in Hudson bay, and about this time several exploration parties were sent out both to the southern district (Nottaway river) and the Labrador peninsula. Ten years or so ago Messrs. Revillon Frères, of Paris, established posts in close proximity to the Hudson Bay Company's establishments; this firm being the first competitor the company have had in this region.

Since the year 1871 numerous expeditions of the Geological Survey Department have been despatched to James bay. The principal of these to the east coast was sent in the year 1877-8 under Dr. R. Bell, F.R.S., and to the south and east coasts in 1887-8 under Mr. A. P. Low. In 1898-9 Dr. G. A. Young made a micrometer survey of the south and east coasts from Cape Jones to the Harricanaw river. This resulted in the excellent map published by the Geological Survey Department.

The Hydrographic Survey (already mentioned) are doing considerable and much needed work in charting the principal river estuaries and mapping the larger islands. The only chart of practical use is largely compiled from notes and memoranda made by a Captain Coates, who was in command of one of the Hudson Bay Company's ships during the years 1727 to 1751. These notes have been published in book form called, "Remarks on the Geography of Hudson's Bay."

When we left Moose Factory late in September, 1914, news of the great war was just beginning to trickle in to all the outlying camps and posts of the bay. The natives seemed far more concerned at the thought of the possible rise in the price of their sugar and a corresponding fall in the price of fur than the all-important outcome of the struggle. To them Germany means absolutely nothing and the British Empire not much more; their minds cannot grasp the fact that their future destinies are being settled on the battle-fields of Europe.

In the Anglo-French wars of the 17th and 18th centuries there was a very good reason for the capture of a Hudson bay fort. The fur trade at that time was the only trade of Canada and a Hudson Bay Company's fort was a point of great strategical value. In common with other posts, Rupert's House was for those times very strongly fortified and armed. The fortifications are now gone, but the cannon can still be seen doing duty as bollards for mooring vessels to the wharf.

LIST OF FOOD FISHES.

The following is, I think, a comprehensive list of the food fishes to be found in the south and east coast waters and tributaries of James bay:—

Name of Fish.	Description of Habitation.
Sturgeon.....	Anadromous, lake and river.
(<i>Acipenser Rubicundus</i> .)	
Whitefish.....	Anadromous and lake.
(Probably two species, <i>Coregonus Clupeiformis</i> and <i>Labradoricus</i> .)	
Tullibee.....	Anadromous and lake.
(<i>Tullibee Argyrosomus</i> .)	
Speckled Trout.....	Anadromous, lake and river.
(<i>Salvelinus Fontinalis</i> .)	
Lake-Trout or Salmon-Trout.....	Lake and river to a certain extent.
(<i>Cristivomer Namayush</i> .)	
Land-Locked Salmon.....	Lake,
(<i>Ouananiche</i> .)	
(<i>Salmo Salar Ouananiche</i> .)	

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Name of Fish.	Description of Habitation.
Long-Finned Charr... .. (<i>Salvelinus Alpinus Alipes.</i>)	Anadromous and lake.
Jackfish or Pike... .. (<i>Lucius Lucius.</i>)	Lake and river.
Pickrel, Doré, Wall-eyed Pike... .. or Pike Perch (<i>Stizostedion Vitreum.</i>)	Lake and river, and to some extent found in tide water.
Sucker (two species)... .. (<i>Catostomus Commersonii.</i>) (<i>Catostomus Catostomus.</i>)	Lake and river and also in tide water.
Ling, or Maria... .. (<i>Lota Maculosa.</i>)	Lake and river, and also in tide water.
Codfish... .. (<i>Gadus Ogac.</i>)	Marine.
Moon Eye, or Toothed Herring... .. (<i>Hyodon Tergisus.</i>)	Lake and river.
Silver Chubb, or Fall Fish... .. (<i>Semotilus Corporalis.</i>)	Lake and river.

DESCRIPTION OF FISH.

A description of each of these fish is given, but at present, with the comparative small amount of information available, only the whitefish, speckled trout, tullibee, and possibly the sturgeon, can be considered commercially valuable.

Whitefish.

Commercially the two species can be considered identical. There can be little doubt that the whitefish fishery of James bay will prove to be one of the most prolific in Canada, equalling, if not surpassing, the fisheries of the Great Lakes.

The whitefish of the bay, that is the sea-run fish, are small, averaging $2\frac{1}{2}$ to 3 pounds (the largest caught by us weighed $4\frac{1}{2}$ pounds). The fish of the interior lakes on the other hand are larger, averaging $4\frac{1}{2}$ to 5 pounds, or possibly more. They are both of excellent quality, but more especially those taken in salt water. The very noticeable difference in weight, between the fish living in the sea and those in the lakes, leads to the belief that there is no connection between the two. Those inhabiting the sea are apparently distinctly marine or, at least, coastwise in their habits except at the spawning time when they ascend the rivers; while the lake fish are believed never to descend to the sea at any time.

Little need be said regarding the lake fish, their habits not differing from those in other parts of Canada.

Range of Whitefish.

The sea-run fish are said to occur in large quantities in the estuaries of the rivers, and along the coast with the first open water in the spring. They apparently go back to deep water amongst the numerous islands as the season progresses. About the middle of August another movement towards the shore takes place, and this increases as the spawning season (beginning of October) draws near.

Their range from the time of open water in the spring until the spawning time in the fall is from Sherrick mountain as far north as cape Jones (the most northerly boundary of the bay and the limit of our investigations).

Practically all the larger rivers, including those on the south coast, are ascended for spawning, but since the majority are considerably broken by rapids and falls comparatively close to their mouths, few fish ascend much higher than 50 or 60 miles. So far as is known they stay in the rivers until the middle of December, when they return to the sea, probably remaining in deep water until the following spring.

Unquestionably the best fisheries are around Big river and among the islands north and south of the mouth of this river.

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The best fishery made by the expedition was in Brandy bay, some 12 miles north of Big river. At this place at the beginning of August some 60 fathoms of $4\frac{1}{2}$ -inch mesh net, 60 fathoms of 4-inch mesh net and 40 fathoms of $2\frac{3}{4}$ -inch mesh net caught about 600 pounds of fish. This, I think, will compare most favourably with any of the fresh water lakes. Undoubtedly, we should have done considerably better by using a $3\frac{1}{2}$ -inch or $3\frac{3}{4}$ -inch mesh net, as the $4\frac{1}{2}$ -inch net caught only a very few.

Eskimo Duck islands, a group of islands, some 10 miles from the mainland southwest of Big river, and the islands around Long point, we also proved to be excellent fishing grounds. Cape Hope, and the islands in the vicinity, can also be favourably mentioned.

Gill-netting is the only method of catching whitefish adopted in the bay, 3 or $3\frac{3}{4}$ -inch mesh nets being generally used for the sea fishing, but in the lakes of the interior owing to the larger fish, 5-inch and $5\frac{1}{2}$ -inch nets are necessary.

The nets are generally set only a few yards from shore; the best location being on a gravel bottom. The Indians on the whole are very poor fishermen, being extremely conservative and never condescending to experiment or try new methods.

The fishing for the winter food supply is done in the general Indian fashion during the spawning season; the fish being "put-up" frozen in barrels. On the east coast seal-blubber is generally fed to the sled-dogs, and is preferred to fish owing to its being a far stronger food, so I did not hear of any large fisheries being established by the trading companies as is generally done in the northwest provinces of the Dominion.

Sturgeon.

I regret not being able to give more information regarding this, the most valuable, individually, of all Canadian fish.

I find that sturgeon frequent in more or less degree Moose river and its tributaries, the Nottaway, the Broadback, and possibly the Harricanaw, Rupert river and others as far north as Big river. This last appears to be their most northerly limit.

There is only one species, I think,—the lake sturgeon; and the same fish occurs in many lakes, such as Nemiskau, Opinaka (East Main), and Wabstaka (East Main).

As a coastwise fish, it inhabits the estuaries and travels up the rivers early in June for spawning. The majority ascend only the first few rapids, but some undoubtedly go higher. They stay in the rivers about three weeks, some (the smallest), perhaps, staying all summer in the deep pools and eddies, and only returning to the estuaries at the freeze-up; it is possible, indeed, that they do not return even then, but winter in the rivers.

The lakes and smaller tributaries at the head of such rivers as the Rupert, the Nottaway, and the Harricanaw all contain sturgeon; this information comes from Indian report.

The largest authentic catch that I heard of was 200 fish taken in one night about four years ago by an Indian on the East Main river. They were all small, probably only averaging about 10 pounds in weight.

We saw no big sturgeon, 35 pounds being the largest, and I should judge that 70 pounds would be a large fish for these waters; although stories are certainly told of fish that by the measurements recounted would weigh well over 100 pounds.

The Indians take these fish by gill-nets (about 7 or 8 inch mesh) or spearing them on the way up the rivers or by very occasionally setting lines.

It is probable that James bay is the last virgin fishing ground for sturgeon in the world, virgin that is to say only as regards commercial fishing, for the trading companies and the natives have for centuries taken their toll for food.

The statistics regarding the Canadian sturgeon fisheries published in the blue-book of the Department of the Naval Service show that for the year 1912-13 there was a

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slight increase in the amount of sturgeon caught over the preceding year. While this is certainly satisfactory, unfortunately there can be little doubt that the sturgeon, unless protected, is in time doomed to become as extinct as the American buffalo.

In his last annual report, the United States Commissioner of Fisheries says, "The story of the sturgeon is one of the most distressing in the whole history of the American fisheries." *The Scientific American* of April, commenting on this, makes the following interesting remark on the report, which, coming from such an authoritative paper, should do much to draw attention to the danger: "For years these large, inoffensive fish were supposed to be of no value, and when, as often happened, they became entangled in fishermen's nets, they were knocked on the head and thrown back into the water. When it was discovered that the sturgeon's eggs were valuable as caviar and the flesh as food a period of reckless fishing began, and in a few years the best and most productive waters were depleted, and what should have been made a permanent fishery of great profit was destroyed. On the Atlantic 7,000,000 pounds to less than 1,000,000 in fifteen years, and an even more rapid decline occurred on the Pacific coast and in the Great Lakes. At present the total annual yield for the whole country is less than 1,000,000 pounds and is decreasing. Meanwhile the demand for the eggs and flesh has steadily increased, with the natural result on prices. A mature female sturgeon now often brings more than \$150.

"The worst of the situation is the fact that all attempts at artificial propagation have failed; so that unless prompt steps are taken to protect the sturgeon by law this fish will be practically extinct in American waters in a very few years. The commissioner recommends that the legislatures of all states, in which this fish exists, or has existed, should absolutely prohibit its capture or sale for a period of at least ten years. Meanwhile the Bureau of Fisheries proposes to transplant into our waters young sturgeon from foreign countries; especially a species from the Danube and the Caspian sea, specimens of which have been offered by the Roumanian government."

Experiments have been made in the United States with a view to the artificial propagation of the sturgeon, but as yet have met with very little success, the chief reason being the great difficulty of obtaining the two sexes "ripe" at the same time.

Sturgeon meat marketed is worth about 12 cents per pound, and the roe prepared as caviar \$1 per pound. The Dominion fisheries blue-book for 1912-13 records that over one million pounds of the fish, and 96 hundredweights of caviar were marketed during the period under review.

The dried air-bladders, commonly called "Isinglass," are also of commercial value; and, I believe, are considered an article of trade with the fur companies in James bay;—but whether a sufficient quantity is obtained from the Indians to export to Europe, I am unable to say.

Speckled Trout.

These fish occur in great quantities, both in the sea as a coastwise fish and in all the suitable streams and lakes of the interior. The small lakes and creeks on Charleton island also contain these fish in immense quantities. The sea-run variety attain a large size, 4½ to 5 pounds in weight being frequently caught.

A net set at random among the islands on the east coast would always catch trout; 40 of these fish averaging 2½ pounds in weight being our best catch for a 40-fathom 2½-inch mesh net.

It may possibly be thought that this species of trout would never occur in such numbers as to make them commercially valuable, but with prices at 10 cents per pound (which is the present price paid by any wholesale dealer in Quebec) it will be seen that even if they were in comparative small quantities, they are fish well worth the catching.

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The movements of the coastwise fish are practically the same as the whitefish, that is—with the first open water at the mouths of the rivers, they appear in great numbers. As summer advances they are to be found everywhere amongst the islands, entering the rivers again as the spawning time (about September 15) draws near. During the winter, from information given me, they appear to stay in large quantities in the estuaries of the rivers, the Indians catching them through the ice by angling and to some extent with gill-nets. The record catch that I heard of was about 140 pounds of trout in two hours made by an Indian woman on a small stream near East Main.

Tullibee.

Tullibee occur in vast quantities as a coastwise fish. A 3-inch or 2½-inch net* set haphazard off the shore or amongst the islands and left for a tide will generally be full. As with the whitefish and trout, the best fishing grounds are, undoubtedly, amongst the islands of the east coast, but they also occur in the estuaries of all the rivers and around the larger islands of the bay, such as Charleton, the Struttons and the North and South Twins. Their movements are almost identical with the whitefish, coming into the rivers as early as September and leaving again in December. They do not appear to go above the first rapids in any of the rivers, but the Indians state they catch them in many lakes of the interior.

These fish should prove to be of great commercial value, if placed on the market absolutely fresh. But the fact is, they deteriorate very quickly, and also are very inferior when caught in the rivers, but the freshly caught sea-fish are delicious and will prove to be most valuable. Owing to their vast quantities, a canning establishment would be a paying industry, at any rate the scheme would be well worth looking into.

The average size caught was about 1 pound in weight, the largest caught weighed 2 pounds.

Lake Trout, Pickerel, or Doré, Pike and Ling.

With the general development of the James bay fisheries quantities of these fish will be caught which alone would scarcely make the business worth while pursuing.

The pickerel, doré, or wall-eyed pike of the district are especially a fine fish, specimens being frequently caught over 8½ pounds in weight. They occur in every stream and lake, and while not entering the sea are frequently caught in nets set in the estuaries in extremely brackish water.

The above remarks apply also to pike or jackfish. Stories were told us by the natives of the great size of the fish inhabiting the rivers and lakes of the east coast. We were, however, unsuccessful in catching any monsters, 12 pounds being our largest, but there is no doubt considerably heavier pike than this are to be found in that district.

Ling are found in most of the lakes and rivers, particularly in the estuaries during the winter time. They grow to a large size—up to 25 pounds, or even more,—and are considered an excellent food fish by all the inhabitants, Europeans and natives alike; although this is contrary to the general opinion held in the western provinces of Canada.

Ling spawn in February or March, but very little is known regarding their habits.

They do considerable damage to the whitefish fisheries, following these fish up the rivers to their spawning grounds and eating vast quantities of eggs and later, no doubt, fry.

* During the spawning season, in the rivers or other suitable places the Indians sometimes use "Seine nets" for catching this fish. These nets are also very often placed below some rapids or falls (generally the first rapids near the sea) and then dragged swiftly ashore. I am informed incredible numbers of Tullibee and other fish are caught in this manner.

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Lake Trout.

Lake trout are found in nearly all the larger lakes and, to some extent, the rivers. The Indians, though, report they never catch them in the estuaries, in this respect differing from the speckled trout.

Their habits are the same as lake trout in other parts of Canada.

They spawn in September, frequenting the shallow gravel bars of the lakes; in places where they are plentiful, great numbers at this time are caught in gill-nets and "smoked" by the Indians.

Land-locked Salmon.

(Called So-a-sa-so by the Indians at Rupert's House, the same name as given the long-finned charr.)

The fish is known in Nemiskau lake, and probably will be found in other lakes on the Rupert and Nottaway rivers. Commercially its numbers are too few to make it valuable, but as a fish for the angler it is considered to excel even its near relative the Atlantic salmon and, therefore, ranks high in the estimation of the world and is entitled to important recognition.

No specimens were caught by the expedition, but information of its occurrence was obtained from a trustworthy source.

Long-finned Charr.

(Commonly called "salmon" in James bay.)

This fish occurs only in the extreme northern limits of the bay; Kapsewis river being practically their most southerly boundary. Beyond Cape Jones, northward into Hudson bay, the Eskimo and Indians report catching these fish in large quantities during the months of August and September.

The movements of this little-known fish are as follow: Towards the middle of August the run begins into the rivers (in James bay the only rivers which they frequent being the Seal, Salmon and Kapsewis). They proceed up these streams as far as the lakes at the head of each river. In these lakes, according to report, they spawn and stay all winter, coming back to the sea at the break-up in the spring.

The natives catch them in gill-nets set at right angles close to the shore, and by spearing them in the rivers, making, as they term it, "a house" of rocks into which by means of wing-dams the fish must enter; there they are speared.

I only caught a few specimens of this fish, but can testify that if they occur in large quantities a fishery would certainly prove to be a paying proposition, as the fish are first-rate in every way.

While I was unable, owing to the limited time at my disposal, and to the instructions received from the department, to proceed further north than Cape Jones, the Eskimo and Indians gave me such information as to lead one to suppose that in Hudson bay proper these fish must be very plentiful, frequenting every stream with a sand or gravel bottom, eschewing the very rocky.

8½ pounds was the weight of the largest "salmon" caught, but they run considerably heavier. The Rev. W. G. Walton, of Fort George, told me that Eskimo had brought him three "salmon" weighing altogether 90 pounds.

It is probable that in James and Hudson bays there are two specimens of charr, very closely allied to one another, one is the species already described, the other being the Greenland charr or Hearn's salmon (*Salvelius Alpinus Stagnalis*).

The old records of residents of Hudson bay are interesting regarding this fish; one writes as follows: "Salmon are in some seasons very numerous. . . . I once found them so plentiful that had we been provided with a sufficient number of nets and salt, we might soon have loaded the vessel with them. But this is seldom the case, for

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in some years they are so scarce that it is with difficulty a few meals of them can be procured during our stay at these harbours. They are in some years so plentiful near Churchill river that I have known upwards of 200 fine fish taken out of four small nets in one tide within a quarter of a mile of the fort; but in other years they are so scarce that barely that number have been taken in upward of twenty nets during the whole season."

Codfish.

(Greenland codfish.)

The above are found on the east coast from a few miles south of East Main river northwards.

The expedition was unable to prove its existence in great quantities, but Indian report tends to the belief that large catches are made in February and March by hook and line.

The largest fish caught by my party was 5 pounds only in weight, but the Indians have told me that they catch them up to a size which, as they express it, "it takes only four to fill a flour sack." This would certainly mean a weight of about 20 pounds per fish.

The extreme north of James bay (Cape Jones) is spoken of as being the best winter fishing grounds for large fish, but many Indians fish in the early spring around Paint Hill islands, Old Moar bay, and, in fact, I believe anywhere around East Main river. I believe a catch of about 200 fish is considered a good morning's work, but I do not suppose the average would weigh much more than 5 or 6 pounds.

Cod are known to occur in Hudson bay. A few schooners from St. John's fish in Hudson straits and Ungava bay every year. There would apparently be, therefore, no reason why these fish should not exist in larger quantities than have yet been found.

Sucker, Moon-eye and Chubb.

These fish while edible must be considered commercially worthless, so long as better flavoured fish can be caught in the same vicinity and with as much ease.

Suckers (of which there are two or three varieties) occur in prodigious quantities, weighing from a few ounces up to 4 pounds. A small mesh net set in any river will be full if left only for a few hours.

Moon-eye appear to be very common in the Moose river and its tributaries and, doubtless, also in other rivers. This remark applies also to chubb.

A Species of Flounder or Flatfish.

An Eskimo gave me the information that he had in July (1914) caught a flatfish in a net set for whitefish near the Cape Hope islands. He described this fish, the first he had ever seen, as being about a foot in length, nearly as broad, and sand-coloured with a few red spots, but white or whiteish underneath.

This was the only flatfish I heard of in the bay, although repeated inquiries were made.

Another fish I heard of as inhabiting Rupert bay bears, from the description, a close resemblance to the "shad." I was informed that this fish came into the Nottaway river (so far as my informant knew this was the only river these fish entered) in late June or early July to spawn. They are never seen except at that time, possibly after the spawning season returning to the deep waters of the bay.

Shellfish.

Mussels, scallops and clams are found in great quantities everywhere on the seashore and among the rocks at low tide. In the report of the Dominion Shell Fish

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Commission of 1912 and 1913, mention is made of the great value of mussels as bait for cod, and the report further urges that the mussel resources of the country be given more attention by fishermen. The attention is also drawn to the great decline generally in the shellfish fisheries.

The expedition, owing to lack of equipment, were unable to dredge, so that the only evidences of the occurrence of shell fish in large quantities were the empty shells found on the beach. This, however, is sufficiently conclusive.

Crabs.

The expedition was unsuccessful in catching any live crabs and the natives generally did not seem to know of them. I saw only shells of two on an island near Sabaskunika bay. An Eskimo told me that in certain parts of Hudson bay large crabs were to be found, but they were not regarded as edible by the natives, who, it must be admitted, have generally managed to find out what is good in the provision line long before Europeans arrived in the country.

Oysters.

While in James bay I was requested by a resident to give some particulars regarding the possible successful culture of oysters in the southern part of the bay.

As is well known, oysters only spawn in water varying from 60° to 70° F. temperature, and also require a certain salinity of the water. The highest water temperature I obtained in the bay was 62° F. in the estuary of Moose river, but this water taken from the estuary was nearly fresh. The highest temperature of salt water obtained was only 54° F.

In Puget Sound, on the Pacific coast, about Lat. 48°, the temperature of the water is found too low for the oyster to spawn, and the beds are kept up by annual plantings of seed oysters.

It may, therefore, be conclusively stated that James bay is not a suitable place for oyster-culture, owing to the low temperature of the water. Apart from this fact, the hard clay bottom of the southern portion of the bay might in many places make a suitable oyster ground.

Seals.

Two species of seals are common in the bay, the "Harbour" (*Phoca Vitulina*) and the "Bearded" (*Erignathus Barbatulus*). The skins of both animals are of great value to the Eskimo, who from them make boats and other articles of clothing and also the covering for their "Kayak." They also highly esteem the meat and blubber as food.

The Indians hunt and kill seals, but the meat and blubber is given to their dogs and the skins traded to the Eskimo who make the long sea boots indispensable along the coast, which in return the Indians buy. It would seem that neither race encroaches on the work that by tradition and custom is done by the other.

Whether seals occur in the northern part of Hudson bay or straits in the great herds such as are found in the early spring on the ice floes off the coast of Newfoundland or Jan Mayen island is as yet unknown, but it would seem not unlikely.

Even should this be the case, it would yet be very problematical whether the ice conditions in James or Hudson bays would permit of vessels proceeding from Port Nelson or other ports of the bay to hunt them.

The Newfoundland sealers leave St. John's not later than March for the sealing grounds, and at that time of the year all Hudson bay is still in the grip of winter. It is claimed (and, no doubt, is the truth) that the bay only freezes around the coast, and that a powerful ice-breaker could very quickly make passage to the open sea. The advent of the railroad will, no doubt, promote much enterprise, and in a few years it may be that Hudson bay sealing vessels will meet with as much success as those of Newfoundland.

Walrus.

Judging by the name walrus or "sea-horse" (the old English name) given to as many islands and points in James bay, this animal must at one time have been fairly plentiful. In northern Hudson bay it is common still, and the old records of the Hudson Bay Company have stories of their sloops and barges being attacked by herds of these animals. I think on the east side of Whale river may be said to be its southern boundary, so it scarcely comes within the purview of this expedition.

White Whale.

(Toothed whale—*Delphinapterus Catadon*.)

The white whale occurs in varying degree over the whole of James and Hudson bays, being probably more plentiful on the west than on the east side.

Fisheries for this animal were carried on by the Hudson Bay Company over 150 years ago, both at Fort Churchill on the west and Whale river on the east, the latter being discontinued according to the old records in the year 1758.

Of late years an effort has been made to re-establish this fishery, but without success.

The method of killing these animals is by the hunter waiting in his canoe and harpooning one when he is fortunate enough to get within range. At Whale river nets were spread across the river and arranged in such a manner that they lay well below the surface. On a whale being sighted in the river the nets were "sprung" and the animal, surrounded by people armed with rifles and harpoon guns, and unable owing to the nets to return to the sea, quickly succumbed.

GENERAL CONDITIONS.

The present methods of fishing in the bay are primitive, but since the fishermen can with ease catch all the fish they want, there is no need for better methods.

In the spring and summer seasons the sea-fishing begins in the middle of June and closes towards the middle of October, a short four months. The river and lake season is, of course, considerably longer, being only stopped a week or so at the break-up and a little longer during the freeze-up.

No fishing takes place off the coast in winter, but the Indians angle for trout and ling in the estuaries and, perhaps, have a net set for whitefish up to Christmas, and in the early spring they angle for codfish off the islands.

The expedition, therefore, is unable to report on the value of the winter fisheries of the bay as no information is available, but there would appear to be no good reason why winter fishing for white fish and tullibee should not be carried on in the bay under possibly only a little severer conditions than fishermen are now experiencing in the more northerly lakes of the western provinces.

The east coast is, undoubtedly, the best fishing ground, of which Fort George may be considered the centre.

As far north as this point it is possible, as I have already written, to find land which when cleared would be suitable for a limited amount of agriculture. Granted this, there is nothing to hinder a fisherman making a very good living from his business, and having as comfortable a home as the average homesteader in the West. But, first, must be assured railroad connection, of which at present in James bay there is none, nor the very immediate likelihood of any. Further away, 800 miles from Fort

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George, the centre of the James bay fishing grounds, is Port Nelson,¹ the terminus of the Hudson Bay railway now building. The questions which must be asked and which require very careful investigation, are:—

(1) Would it be feasible and profitable commercially to run refrigerating boats or vessels solely for carrying fish from Fort George to Port Nelson?

(2) The best method or methods of preserving fish for shipment to a market some hundreds of miles away?

Whitefish (of all kinds) unless well frozen deteriorate very quickly. Trout and cod can be salt cured, but this is not very suitable for whitefish, although in the Great Lakes in former years considerable quantities were thus treated.

Smoking would be feasible and the Indian smoke-cured whitefish is delicious. In Alberta I have eaten these fish cured by a German patent process and found them excellent, equal to the best finnan-haddie. For the tullibee, occurring as they do in such great quantities, I believe a cannery would be a paying venture; the fish should be put up in the same style as the canned herrings, now largely sold.

Regarding the codfish fishery, I am not sure whether climatic conditions are very favourable to drying fish, but if not, the catch can, of course, be salted.

The fisheries of the interior lakes must depend for their development on the railroad, which is, in the future, expected to reach the southern shore of James bay from some point on the National Transcontinental railway.

Nemiskau lake and others of the same group near the Nottaway, Broadback, and Harricanaw rivers, are excellent fish lakes, but at present being considerably over 150 miles from the National Transcontinental railway, are absolutely worthless for commercial fishing. I should judge 100 miles to be the farthest distance it is profitable to freight fish by "sled haul," and to accomplish this successfully, it would be necessary to have a fairly good road, and in summer this country would be absolutely impossible to travel over, unless roads were built at great cost over country which is to a large extent swamp.

From information I received, it seems that some of the smaller rivers flowing into lakes Mattagami, Evans, and others of that region, are in the spring and summer very prolific of sturgeon.

The lakes of the east main coast are, from all reports, excellent fish lakes, but far too distant to be worth considering commercially either at present or probably for many years to come.

The finding and exploitation of minerals on the east coast, always a great possibility, may lead to railroad development in the near future, which is at present undreamed of. Apart from this, however, it would seem that the terminus of the James Bay railway will be on the southern shore.

From Fort George to Moose river (the possible terminus of a future railroad) the distance is about 200 miles in a straight line; and this distance must be taken into account and reckoned with in considering the value of the James bay fisheries.

SUMMARY.

The result of the investigation of the fisheries of James bay may be summarized as follows:—

(1) The question of railroads is of paramount importance; without them the fisheries are worthless; unless the ice conditions of northern James bay and southern

¹ From Fort George to Winnipeg (via Port Nelson and the Hudson Bay railway now under construction) the distance is approximately 1,920 miles. From Prince Rupert (the headquarters of the northern pacific fisheries) the distance to Winnipeg via the Grand Trunk Pacific railroad is 1,745 miles. If it has proved profitable to send fish to Winnipeg, Chicago and other points in Central Canada and the United States from Prince Rupert, the comparatively small extra mileage from Fort George should be no impediment to James bay fish being marketed in the same places under practically equal terms.

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Hudson bay are such that a "fish carrying vessel" can make continuous journeys in summer between Fort George and Port Nelson. At present these conditions are unknown except in August and September.

(2) Provided that the conditions mentioned above are satisfactory, it would be necessary to investigate very carefully the cost of running such a boat and its general feasibility.

(3) It has been mentioned in the general report that the conditions of climate on the James bay coast, while perhaps severe in winter, are sufficiently favourable for growing some garden produce and the hardier crops, so that there is nothing to prevent Europeans living in health and, let us hope, in comparative happiness, as the fur traders and missionaries, their wives and families are doing now and have done for generations past.

(4) With the first two questions favourably settled, there can be little doubt the whitefish fishery will prove one of the greatest in Canada, and with its development the other fisheries will become of immense value.

The following specimens were collected by the expedition on the east coast of James bay during the summer of 1914, and determined by Mr. A. Halkett, of the Dominion Fisheries Museum, Ottawa:—

Trout Perch (*Percopsis Guttatus*).

Long-Finned Charr (*Salvelinus Alpinus Alipes*).

Sand Launce (*Ammodytes Americanus*), (Possibly the Form "A"—*Dubius*.)

Cottoid.

Daddy Sculpin (*Myoxocephalus Groenlandicus*).

Sculpin.

Whitefish (*Coregonus*).

Tullibee (*Argyrosomus*).

Greenland Codfish (*Gadus Ogac*).

BIRDS.

Mr. W. G. Todd (Curator of Ornithology, Carnegie Museum, Pittsburg, U.S.A.), whom I met this summer in James bay, kindly gave me a list of birds found in the bay destructive to fisheries. They are as follows:—

Ring-billed Gull.

Herring Gull.

Bonaparte Gull.

Arctic Tern.

Common Tern.

Double Crested Cormorant.

Two Species of Eider Duck.

Surf Scoter.

Merganser.

Mandt's Guillemot.

Loon (Great Northern Diver).

Red Throated Loon.



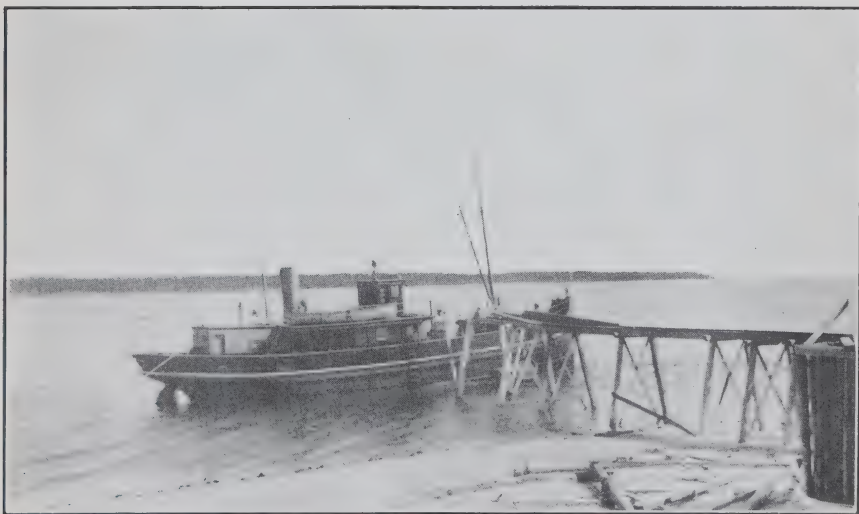
Ruperts House.



Rupert's House.



East Main Wharf.



Hudson's Bay Co.'s steamer "Inenew" at Charleton Island.



The Canoe and Outfit, Department of Fisheries.



Rapids on the Missanaibi River.



Indian Canoes at Wastikum.



Whitefish taken at Brandy Bay.



Indian Canoe at Hannah Bay.



Salt Marshes, Hannah Bay.



Hannah Bay—Left by the Tide.



The schooner "Violet" hired for the trip to the North Twin Island.



Indians fixing the fishing nets on board the "Violet."



Setting a Whitefish Net.



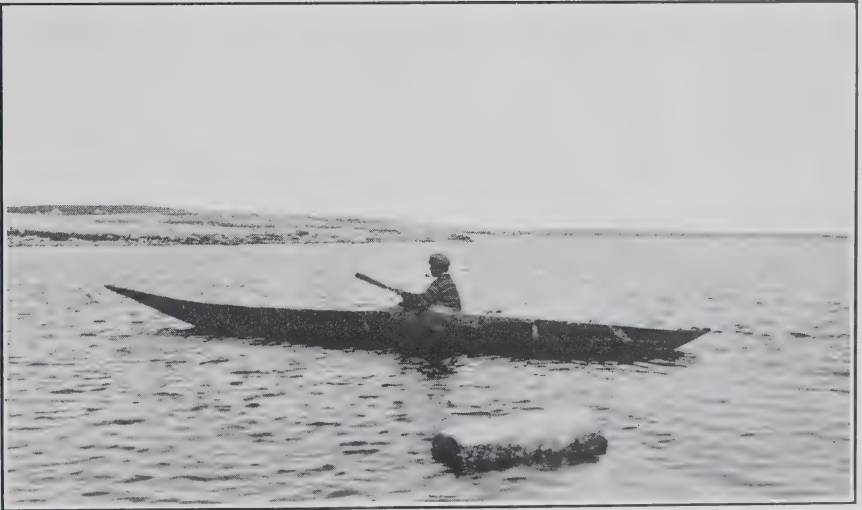
Indian Fishing Camp.



Dinner at Cape Hope.



Indian Canoe at Sabaskunika.



Eskimo in Kayak at Cape Jones.



Cape Jones.



Eskimo at Cape Jones.



Indian Women at Cape Jones.



Eskimo Women at Cape Jones.



Net full of Tullibee.



Trout taken at Long Point.

A REPORT ON
THE FISH AND FISHERIES
OF THE
WEST COAST OF JAMES BAY
BY
A. R. M. LOWER, B.A.

DEPARTMENT OF THE NAVAL SERVICE,

OTTAWA, December 1, 1914.

To the Deputy Minister of the Naval Service.

SIR,—I have the honour to present to you the following report, being an account of an expedition sent out during the past summer to collect information in regard to, and to investigate, the fisheries of the west coast of James bay and of the rivers flowing into it.

I have the honour to be, sir,

Your obedient servant,

A. R. M. LOWER.

INTRODUCTION AND SUMMARY.

It has been deemed that the usefulness of this report would be much increased if a summary, containing the salient points and essential facts, were appended. Accordingly the following short synopsis of my investigations is appended:—

The region about James bay is underlaid by a series of sedimentary rocks, mostly bedded limestone. These rocks not only underlie the land but extend for many miles under the water; as a result the land is very flat and the water, having such a slight and gradual slope, for many miles out from such coast as there is, is very shallow. The rivers, discharging over these limestone flats, and bringing down vast quantities of sediment from the soft clay country through which they run, have naturally large bars at the mouths. These bars spoil the entrances to the river mouths and there is thus not one harbour for large ships on the coast. About eight feet of water at high tide is the best that can be obtained in the biggest of these, the Albany. There is only one island on the coast—Agumiski; it is seventy miles long and lies eight miles off the coast at its north end and about sixty at its south. Between this island and the shore the rapid tide that races up and down the strait has worn out a channel of considerable depth. This channel is about three miles wide and outside of it the water is usually very shallow; it is not unusual to find only six feet of water at a distance of four or five miles from land. The tides average about five feet in height but are very much affected by the winds. Continued south winds almost destroy the tides, while continuous north winds pile the water up to great heights at the south end of the bay. In the rivers the tide runs up from four to twelve miles but the salt water does not penetrate much beyond the bars.

There are sixteen different species of fish found on the west coast or in the rivers flowing into it. The peculiarity about these fish is that with exceptions of no economic value, they are nearly all fresh-water species. The most valuable from a commercial standpoint is the whitefish and the river in which it is found to the greatest extent is the Albany. From the estuary of the Albany, there is known to be taken year after year, the amount of 13,000 pounds; besides this amount, a population of some four hundred finds abundant sustenance. Unfortunately the presence of the fish in these rivers is not continuous; from the middle of June to the middle of August nearly all the estuaries are devoid of fish of any sort; it is probable that the anadromous fishes are out in the deep water of the middle and eastern part of the bay. All the above amount is taken in the last two weeks of October, though the supply is just as great from the last of August as it is at that period.

It should be noted that the above figures include the fish called tullibee which differs from the whitefish merely in the shape of its jaw, and in a slight inferiority in food value.

Sturgeon are not numerous on the west coast but they are caught regularly every spring and fall; sometimes they are obtained up to a length of seven feet but that is very rare, the more usual size being about three feet. There are vast numbers of suckers to be obtained in every river. As the country has agricultural possibilities, these may possibly be useful some day for fertilizer; at present their value is nil—as, for food, it always will be.

There are a great many speckled trout caught each year in the rivers of the northern part of the coast; these fish average a pound and a half in weight and form about the best food fish that can be obtained. They are anadromous in their habits, their movements coinciding with those of the whitefish. They are much larger than the ordinary brook trout and altogether one of the best fishes of the coast. In this con-

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nction it should be stated that the whitefish ordinarily taken in the fall and making up the bulk of the catch, is not a mature fish that has entered the rivers for the purpose of spawning but an immature fish of one or two years growth that has merely come in in obedience to the habit that will later cause it to return to spawn.

The rivers of this coast contain fair quantities of both pike and pickerel but it is likely that if anything like fishing on a wholesale scale were introduced they would soon be stripped of these two species. The pickerel are probably numerous enough in the Albany to withstand the inroads that one or two fishermen in a small way would make on them but if systematic exploitation of the waters were allowed they would soon disappear.

The other species of the west coast are not of a great deal of economic importance; rock-cod occur in the bay and it is said that the true cod does also, but there is no record of a single specimen of either of them ever having been found on the west coast.

Besides the strictly fish wealth, there are other forms of marine life possessed of considerable value; one such is the white whale, another is the seal. The former occurs in great numbers and as he is quite valuable for his oil—of which he yields 100 gallons each, it may be expected that an industry founded on his products will develop as soon as the market is brought near enough to the place of production. The seal is not the fur seal but its hide makes extraordinary waterproof bags, boots, gun-covers, and so on.

There are two large rivers on the coast, three of fair size and numerous smaller ones besides unlimited creeks. There are some fish to be found in all of these but the most valuable are the Albany, the Kapiskau, the Lowashy and the Attawapiskat.

The best way at present to get to James bay is to go down the Kenogami-Albany system; there is no need to take very much food along, as trading posts are abundant and their prices not very much higher than at Cochrane. Travel along the coast, owing to the peculiar tidal conditions is slow and tedious and seldom is undertaken without the help of an Indian guide, who knows the landing and camping spots. The fishing gear used is made up entirely of gill and seine nets; the latter are used by the fur companies, the former by the Indians. Nets of a small mesh are the only useful ones; the Indians' nets are never more than two inches. It is often difficult to set nets, owing to the strong currents and the rubbish they carry, but the Indians have devised a method of staking nets which overcomes that obstacle to a certain extent. Deep water fishing on the west coast has never been undertaken so that it is hard to say what are the conditions attached to it. So far as the party with the limited apparatus at its command could determine, the tidal currents are as dirty as are the river ones and quickly fill up a net with sea weed.

The greatest difficulty a fisherman on the west coast would have to contend with would be the lack of harbours or of any shelter to which he might run in case of bad weather; only the very smallest of fishing craft would be able to get into the rivers at low tide and if caught by an offshore gale and an ebbing tide they would not be able to get in at all unless they possessed some mechanical power. This disadvantage is to a certain extent balanced by the infrequency of really serious gales. To sum up in a general way, it may be stated that the west coast of James bay offers at present great opportunities for fishing at certain limited times of the year but that at others, its value for this industry—apart from the unknown contents of the water several miles offshore—is nil.

I should like to express my thanks to the officers of Revillon Frères and of the Hudson's Bay Company at all the posts on the bay at which I was present for their unfailing courtesy and willing assistance.

A. R. M. LOWER.

SESSIONAL PAPER No. 39a

I.—A REPORT ON THE FISH AND FISHERIES OF THE WEST COAST OF JAMES BAY.

A.—INSTRUCTIONS.

The instructions I received from the Superintendent of Fisheries directed that I should proceed from Ottawa to Cochrane, Ont., where I was to find men and equipment for an overland journey to James bay. I was to go down the most suitable river leading to the bay and from its mouth, travel along the west coast until I should come to the last river of importance on that side of the bay. From thence I was to turn south and work my way back to Cochrane. It was to be my business to gather all possible information about the fish and the fisheries of James bay—and also any other facts that would be useful in connection therewith—more particularly about the fish and fisheries of the rivers and river estuaries, but also so far as circumstances would permit, about the conditions in the main body of bay itself.

ITINERARY.

I left Ottawa on June 4 and went at once to Cochrane, in the company of Mr. C. D. Melvill, who was undertaking similar work on the east side of the bay. Leaving him at Haileybury, to arrange for the transport of the four men he had engaged for us at that point, I went to Cochrane to arrange for that part of our journey which was to be performed over the National Transcontinental railway. Both parties spent the next two days in Cochrane, purchasing supplies and making other preparations for the trip. A journey of 200 miles which owing to the unsatisfactory state of the train service was stretched out over several days, brought us to the Nagogami river, down which it had been decided to go.

Our second day's paddling brought us to the junction point of several rivers—locally known as the Mattawa. At this point is situated the small fur trading post of "English river." Having passed a day or two for inquiries at this point, we went on down the Kenogami, as the river is termed after its numerous branches come together, and in two days reached the Albany. The Albany is a very large river with a very rapid current and as a consequence we did not stop along its course to set nets or to perform other fishing operations. Eight days after our departure from the railway we came to Fort Albany, situated about seven miles from the mouth of the river. As my instructions called mainly for an investigation of the river estuaries, I judged it wise to spend considerable time at Albany, both for the purpose of fishing, myself, and for gathering information from Indians and others whom I met there. The results of these investigations as well as others made during the summer are noted in the main body of this report.

Leaving Albany, I secured the services of an Indian guide and set out for the next river of importance—the Kapiskau. This was reached after a trip of a few days along the open sea-coast. After a brief stay there we left and on the same day got to Lowashy river—really the most southerly mouth of the Attawapiskat. This latter river is the site of the only permanent settlement north of Albany. Here both the Hudson's Bay Company and Revillon Frères have establishments and here all the Indians from the north and the west over a region of several hundred miles, congregate. The party remained at Attawapiskat for several days, adopting much the same methods as had been employed at Albany. A small schooner was obtained in which we crossed to the large island of Agumiski about fifteen miles distant from the mainland. After a few days there, we again came to Attawapiskat and continued our inquiries. Then taking advantage of the sailing of Revillon's schooner with supplies for the small winter post they maintain on the Opinegau river, we proceeded

northward once more, making no stops until the Opinegau was reached. This is only a small river but it proved to have several interesting features. Only one river of any size flows into James Bay to the north of the Opinegau, the Nagedowzaky, and accordingly when we had reached that point we turned back. The route pursued on the return journey to Albany was of course the same as that followed while going north. From Albany I crossed in the French company's steamer to Stratton island and from thence to Moose Factory. At that point I met Mr. Melvill and we arranged to make the up-river journey together; we followed the Moose river up to the forks of the Missinabie, at which point we branched off onto the Metagami. Two days journey from the railway, we came to the Ground-Hog river which was the route followed until October 9 on which date we reached the railway.

HISTORICAL.

The great land-locked seas of our northland have been the scene of trade and adventure for three centuries. Despite this long stretch of time, their resources are still very much matters of speculation. It was in the year 1610 that Henry Hudson perished there miserably, set adrift by his mutinous sailors. Nineteen years later Captains James and Fox passed through the straits and explored the bodies of water which bear their names to-day. James sailed along the west coast from Nelson southward, landing at the long flat point which marks the entrance to the smaller bay. This he named Cape Henrietta Maria, from the Queen consort of the day. A few miles further south, on one of the low gravel ridges that stand out as the only breaks in a shoreline of incredible monotony, he buried one of his men. "Mourning Point" a distance south of the river Opinegau bears testimony to the event. James wintered that year at Charlton island, thus marking out the spot that was to serve as rendezvous to trader and explorer till the present day. In 1662, came Radisson, French fur trader and wood-runner. Meeting with naught but rebuffs on his return to Quebec, he was driven to offer his services to the English. As a result of the voyages that he and his brother-in-law Groseilliers—naively referred to by his employers as "Gooseberry"—undertook, the first post of what was to be the Hudson's Bay Company was established at the mouth of the Rupert river. From that time on the history of James bay becomes the history of the Hudson's Bay Company. In another half dozen years the "Gentlemen Adventurers" had established themselves more securely, were possessed of outposts at Moose and Albany and a depot on Charlton island for their annual ships. When a few more years had passed, these places had grown into substantial establishments and others had been begun.

Meanwhile friction with the French went on unceasingly. Cargoes were seized, crews were massacred and forts were taken and retaken with commendable regularity. A decline in the trade on the east of the bay was found to be due to the appearance of the ubiquitous French wood-runner on the head waters of those rivers down which the Indians were in the habit of travelling to the English posts. Such a situation caused the more attention to be directed to the tribes of the west coast about the Albany and the Severn. But it was not long that the company was allowed to remain undisturbed in the possession of the enormously profitable trade of that region. Trouble was brewing at Quebec, and in 1685, after several mysterious visits of individual Frenchmen, who one and all declared that they came merely "to see the country" an expedition was organized by permission of Denonville, Governor of New France. It made a successful journey overland and speedily reduced all the English possessions on James bay. The following extract from the writings of Miss Agnes Laut gives a vivid picture of its proceedings, more especially of the taking of Albany, the chief fort on the west side.

"THE OVERLAND RAID ON THE POSTS OF THE HUDSON'S BAY COMPANY."

"Sixty-six swarthy Indians and thirty-three French wood-runners, led by the Chevalier de Troyes, the Le Moynes brothers and La Chesnaye, the fur trader, were threading the deeply forested, wild hinterland between Quebec and Hudson's bay. After taking Moose Factory and Rupert's House, with prisoners, ship, cannon and ammunition, the French set sail westward across the bay for Albany. The wind proved perverse. Ice floes, drifting toward the south end of the bay, delayed the sloops. Pierre Le Moynes D'Iberville could not constrain patience to await the favour of wind and weather. With crews of voyageurs he pushed off from the ship in two canoes. Fog fell. The ice proved brashy, soft to each step and the men slithered through the water up to the arm-pits as they carried the canoes. D'Iberville could keep his men together only by firing guns through the fog and holding hands in a chain as the two crews portaged across the soft ice.

"By August 1, the French voyageurs were in camp before Albany, and a few days later de Troyes arrived with the prisoners and the big sloop. Before Albany, Captain Outlaw's ship, the *Success*, stood anchored; but the ship seemed deserted and the fort was fast sealed like an oyster in a shell. Indians had evidently carried warning of the raid to Sargeant (the factor) and Captain Outlaw had withdrawn his crew inside the fort. The Le Moynes, acting as scouts, soon discovered that Albany boasted forty-three guns." But "if the French had but known it, bedlam reigned inside the fort. While the English had guns, they had very little ammunition. Gunners threw down their fuses and refused to stand up behind their cannon till old Sargeant drove them back with his sword hilt. Men on the walls declared that while they had signed to serve they had not signed to fight, and if any of us lost a leg, the Company could not make it good." The Chevalier de Troyes with banner flying and fifes shrilling, marched forward. . . . Bombs began to sing overhead. Bridgar came under a flag of truce to Sargeant and told him that the French were desperate. It was a matter of life and death. They must take the fort to obtain provisions to return to Quebec. If it were surrendered, mercy would be exercised. If taken forcibly, no power could restrain the Indians from massacre. And Sargeant. . . . had his family in the fort. Just at this moment one of the gunners committed suicide from sheer terror and Captain Outlaw came from the powder magazine with the report that there was not another ball to fire. Before Sargeant could prevent it, an underling had waved a white sheet from one of the upper windows in surrender. The old trader took two bottles of port, opened the fort gates, walked out and sat on a French cannon while he parleyed with de Troyes for the best terms obtainable. The English officers and their families were allowed to retire to Charlton island to await the coming of the company's yearly boats.

The Chevalier de Troyes bade his men disband and find their way as best they could to Quebec. Only enough English prisoners were retained to carry the loot of furs back overland. The rest were turned adrift in the woods. Of fifty prisoners only twenty survived the winter of 1686-87. Some perished while trying to tramp northward to Nelson, and some died in the woods after a vain effort to save their miserable lives by cannibalism."

Within the next decade the fur posts changed hands frequently. At the treaty of Ryswick in 1697, it was provided that each nation should retain what possessions they had at the time the treaty was made. This left the Hudson's Bay Company owners of but one fort and that was Albany. But the fortunes of war varied again in succeeding years and at the Peace of Utrecht (1713), England was able to force the French to give up all their claims to territory in the Hudson bay region. Since that date all interference by force of arms has ceased, but the company has had to meet the competition of the *Coureurs de Bois*, who, by 1733, had succeeded in penetrating into the very interior of Labrador, and of the North-West Company which from its

inception in 1770 to its amalgamation in 1821 proved a very troublesome opponent. For the last century James bay may be said to have had no history, other than what is included in the unceasing round of trading, and hunting, of fierce struggles with the cold of the arctic winters and of long trips of exploration in the pleasant summers.

B. GEOLOGICAL.

To give a general idea of the bay and the regions surrounding it, it will be necessary to set down a brief résumé of the chief geological features that are met with.

The North American continent is built about two axes or backbones—the Rocky mountain system in the west and the Appalachian and Laurentian areas in the east. The latter of these, variously known as the Laurentian, the Archean or the region of Igneous rocks, extends in one direction from the northern part of the North Atlantic states through Quebec, Labrador, on to the shores of Hudson straits and Baffin's land. Another great wing is flung off from the main branch in the west of northern Quebec and passing through Ontario—where it forms the rock masses of Muskoka and the northern districts—extends in a northwesterly direction to the shore of the Arctic, some distance to the east of the Mackenzie river. The whole mass is thus roughly triangular in shape with the apex to the south and the base to the north. Hudson bay may be considered as a huge 'V' cut out of the base of this triangle. At the close of the Archean period, with the exception of some geological "islands" in the Appalachians, this was the only portion of North America that had risen above the water. It thus supplied the shores, both to the sea that has since become the Atlantic ocean and to that great inland body of water whose disappearance has given us the wide prairies of the west. On these shores was laid down in layers of varying width and thickness the sediment that was eroded from the mass of the Archean "backbone." At the same time the swarming marine life of the time, contributed a vast amount of lime to the ooze that was constantly sinking to the bottom and being hardened by the pressure of the accumulations above it. Sooner or later the sea bottoms began to rise and when that process had gone on long enough, dry land began to appear at the edges of the Archean shore lines and the second great series of rocks made their appearance. These were the rocks of the Palæozoic period and they differed from the Archean type in that they were formed out of sediment and lime, in layers under water and gradually hardened by pressure from above, as has been stated. They consisted mainly of limestones. With those on the southern border of the Archean mass, we have nothing to do but with those on the northern, we must deal as being those rocks which underly most of the district around the south and south-west coasts of James bay and also a large part of the bay itself. The new land thus formed extended outward from the shores of the old rock mass a distance of two or three hundred miles to the east and along those shores from north to south, considerably farther. Thus a region as large as old Ontario had arisen above the sea. At the close of that first movement, James and Hudson bays had almost received their present outlines. All that was lacking was the area lying between a line drawn from about the Ekwan river north-west to the Severn and the present Cape Henrietta Maria. When the same process of deposition of sediment and calcareous shells had gone on for some time longer and when another raise in the sea bottom had taken place, a new space of dry land which occupied the above mentioned area, made its appearance. This land consisted of limestone rocks differing but little from the last. The geological centre of all this palæozoic area is supposed to be located under the waters of James bay off the mouth of the Albany river; the bed rock thus extends unbroken from far inland to a long distance out in to the sea. In forming an idea of the appearance

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of the country on the west side of James bay, then, it will be important to remember that it is all underlaid by level floor-like areas of limestone and that the only elevations or depressions that can occur must necessarily be made out of the material overlying these areas—that is, there can be no rocky hills or ridges.

The great ice-age came and went and the palæozoic limestones became covered with a thick layer of glacial “drift”;—that is, the glaciers in retreating left behind them the debris that they had carried; this debris consisted of layers of boulder clay which were deposited almost uniformly over the whole territory. Dr. Bell, of the Geological Survey, in describing this feature of the country says: “The drift is a continuous sheet varying in thickness between 30 and 90 feet... it becomes thinner as we rise higher and get further inland. It is of a looser and less clayey nature in the higher grounds and consists largely of washed gravel and shingle.”

The ice sheet was of enormous thickness and it is supposed that its weight was sufficient to depress the level of the country to far below the surface of the sea; in some places this submergence is supposed to have been as much as five hundred feet. The result was that all the area so depressed became silted up with pretty much the same material as had been deposited to form the limestones of the earlier period. But still another elevation of the land taking place before the pressure had become strong enough to harden these materials into solid rock, the new deposit rose from the water in the form of a marine clay and it is this marine clay of which most of the land around the bay consists to-day.

These two deposits—the glacial drift or boulder clay and the later sedimentary or marine clay make up all that country which commonly is called the clay belt and which extends from about the line of the National Transcontinental railway northward almost beyond the limits of the district of Patricia.

That such is the case is born out by the present appearance of the country; it is one vast wooded plain with a gradual and uniform slope to the north and east; in the whole course of the Kenogami and Albany from English river post to the sea there is not a single elevation of any one point above the surrounding country. As might thus be expected the sea coast is singularly flat and low; it is so flat that land is lost sight of when but a few miles out. And in the same way the shore presents no variation in appearance; its features are absolutely the same throughout its length; the whole vast plain slopes down to and under the water at a very slight angle; if one can imagine a board of a few feet in length, part of which is under water and part of which is not and which at its one end is immersed but an inch or two and at its other is elevated but an inch or two, he will have a good idea of the nature of the country. The water on the west coast is exceedingly—unbelievably—shallow just as the land is exceedingly flat. A typical piece of coast line is that at the mouth of Chikeney creek. At that point, the woods are about three miles back from the average high tide mark. Between the forest and the tide mark is an open, level plain, the first mile of which is covered with scrubby willows. The other two miles support a growth of luxuriant grass. This grass gradually gets thinner as it approaches the water until at last only scattered bunches of it remain. Between the extremes of high and low tide, a space of about three miles of soft clay mud intervenes; this is also perfectly flat and covered with small boulders. On the mud when the tide is out lie shallow pools of salt water. From the last bunches of grass it is hardly possible at low tide to see the open water. Under the surface at low tide the same level stretch continues so that even a small sail boat of very light draft has to keep several miles out in order to obtain sufficient water. The slope becomes a little more rapid about ten miles off shore and when the middle of the bay is arrived at a fair depth is obtained.

The only variation that is met with consists in the mounds of pebbles which line the shore from Neakwow point northward. These mounds may reach a height of several feet—when they do so, they are locally referred to as “bluffs”. They sometimes form

long sweeping points and are undoubtedly the result of ice action; the winter ice which in this part lingers about until the middle of July, tossed and retossed upon the coast, has scraped them up from the mud flats between and beyond the tide marks and deposited them in heaps upon the beach. At a few points the action has been vigorous enough to grind the pebbles into sand; with the exception of the creeks and rivers, these are the only places at which it is possible to land directly onto dry land; at all others, the canoe must be left lying on the mud and the camp outfit portaged through the mud to a dry spot further back.

Throughout the wooded plain the rivers of the country run. They are nearly all quite similar in general characteristics. In the first place there are few portages; on the Albany and Attawapiskat, for two or three hundred miles, there are none at all; and the Albany is navigable for fair sized craft for all this distance when the water conditions are good. They are all swift and carry down vast quantities of sediment to the sea. Few of them afford quiet places or backwaters; in all of them the current usually sweeps straight along, wearing down the points and straightening out the channels between the islands. Islands are formed quickly; first a sand bar, then a little grass appears; next a few willows begin to grow and if the ice is not too devastating in its effects trees such as small poplars take root. More soil is added by the ice every spring until at last an island is formed. But no sooner does it attain a level of a few feet above the water than it begins to disappear again; the incalculable force of the spring breakup, works on the up-stream end, tearing away bank, trees and soil, carrying all down stream to be deposited in another place. Thus a constant process of island formation and island destruction is going on; we could almost imagine the same island beginning hundreds of miles up stream and gradually travelling downward until it reached the river mouth and was carried out to sea there to add its contribution to the enormous bar that stretches across the river mouth.

The sides of all the rivers are concave in shape and vary from four or five feet in height at the sea to fifty or more up country. They are all quite free from undergrowth and afford excellent walking; their openness makes them peculiarly suitable for such a process as seining. The winter ice as it rushes down in the spring sweeps them clean and presses the boulders that it carries deep into the clay; thus are formed the well-known "pavements"—stretches along which the bank is literally and uniformly paved after the manner of a cobblestone roadway.

While the above remarks are true of the rivers of the west coast they will not apply in their entirety to the Moose system of the south west. This system travels a much shorter distance from the Archean highlands and in consequence has worn down its bed further below the level of the country; in fact for the greater part of its course it has worn away all the surface clay and travels over bedded limestone. As a result small rapids occur constantly, the river bed is very wide and the water very shallow; only at moderately high water is it even easily navigable for canoes. The limestone exposures however form numerous coves and quiet pools where nets can be easily set and where fish congregate in large numbers. When this river enters the Archean area its character, of course, changes again; rapids occur at intervals only and when they do so are of considerable size and length; between them the water is held up in long quiet lake like stretches of little current. The banks too become rocky and abrupt, usually steep and when not so, covered with a dense growth of shrubs.

WATER CONDITIONS.

Under this heading I propose to set down those observations I made which I have reason to think would be helpful to anyone wishing to gain a knowledge of the local conditions of that region, either for practical purposes such as those of the sailor and fisherman or for more academic ones.

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A general idea of the coast line is given under the section dealing with the geological structure of the country; it may be added here that the coast is almost straight and runs slightly to the west of north; there are no natural harbours except the river mouths—which will be dealt with later. The only variations from the straight line are wide shallow bays which afford no protection from the weather. A typical bay might be ten miles across and a mile or so deep. Twelve miles off shore, the land is lost sight of and at two miles the entire visible portion of coast to be seen would probably be not more than fifteen miles. At that distance the shore presents the appearance of an even black line, subtending an angle of about 120 degrees; outside of this the black gradually fades out against the skyline.

Owing to the slight depth and the muddy bottom, the water is seldom clear; its usual colour is brownish-yellow; after a long period of calm, however, it may get to have not very large traces of this colour. Of course, the deeper it gets the clearer it also becomes and at four miles or so from the high tide mark—the nearest course to land that small sail-boats can follow—it is clear as often as not. James bay water has been described as “slightly brackish” but it is unmistakeably salt; it is only in the neighbourhood of great rivers such as the Albany that it can be called “slightly brackish”.

Over the slightly submerged plain that forms the bottom and shores of James bay, the rivers discharge. The channels they have worn out for themselves are in comparison to the amount of water carried, surprisingly shallow. Some of the rivers indeed which are of a fair size almost lose themselves at low tide, spreading out over the flat expanse of mud to such an extent that they may be said to have no channel beyond the grassy plain; even a river as large as is the Bowashy spreads its waters out over such a wide area on the mud banks at low tide that a canoe can hardly enter it. Thus all these rivers must be entered at high tide, at which time one has beneath him the depth of the tide plus whatever water is naturally in the river.

About two miles from low water mark or about an average of five from high, one gets six feet of water. Another two miles gives a depth of twelve feet, or more. At fifteen miles out from Albany, the lead registers seven fathoms, at twenty miles fifteen fathoms, at sixty miles from Albany on the course to Stratton island the maximum depth of the southern portion of the bay 35 fathoms is reached; this depth decreases slightly between that point and Stratton Island. The maximum depth to the west of a line drawn from the mouth of the Moose river through the Gasket shoal to Cape Henrietta Maria is according to the soundings of the master of Révillon Frères' steamer *Emilia*, between 20 and 28 fathoms. The Gasket shoal lying about east by north sixty miles out from the Albany is a low heap of clay and boulders about three miles long, with bad approaches of smaller shoals and boulders; quite near it on the south side a depth of twelve fathoms is obtained. The gentleman referred to above believes it to be a continuation of Agumiski island whose southern extremity is surrounded by vast stretches of shoals leading in the direction of the Gasket.

Agumiski island (“Agoomiskik”—“the land across”) is about 70 miles long and roughly triangular in shape with the base at the northern end and the main axis running in south-east by easterly direction. Its most northern part lies a little to the north of Neakwow point and its southern is between 50 and 80 miles north-east by east of Albany. The island is not shown correctly on any of the maps of that region. It is similar to the mainland in appearance but its western shores are heaped high with banks of pebbles and the forest comes within a few feet of the water's edge. In winter the strait between it and the main shore is frozen over at its northern end; it is seldom, however, that a space wider than 15 or 20 miles freezes; this means that the only portion connected with the mainland by ice is the projecting westerly point lying off the mouth of the Attawapiskat. Here in one place the strait is only about 8 miles wide and is broken up by a few small, flat islands—the Manowinan—the only

ones on the coast. The ice, however, for a few miles north and south along that part of the coast and island becomes quite solid and is regularly crossed both on foot and with loaded dog sleighs.

The main shore north off the Attawapiskat river sweeps round to the northeast in a large curve terminated by Neakwow, that is "Sand" point. Into this curve the western projection of Agumiski fits, the Manowinan islands being given off at the western extremity of the island and the narrowest point of the curved strait. North of Neakwow point the land slopes rapidly back to the west. This conformation, as will be seen, has a great deal to do with the action of the tides. The only other point at all similar to Neakwow is that locally known as the "Cock" situated midway between the Moose and Albany rivers.

TIDES.

In height the tides are very uniform throughout the bay. A high tide is six feet or over, an average tide is about four feet. As entrance or exit to or from the rivers is so absolutely dependent upon the tide and its freaks, it is essential to have a clear idea of the factors affecting these movements. Owing to its shape—a huge, almost landlocked body of water lying from north to south—and its shallowness, the James bay tides are very much affected by the wind. As a general rule, it may be stated that a north wind makes a good tide and a south wind a poor one. The reason of this will appear later.

The tide enters the bay from the north, travelling from the straits in a south-westerly direction. It spreads uniformly over the entire body until it reaches Agumiski island and Neakwow point. At these places it splits; that portion of the water that comes to Neakwow point divides, the main stream turning north and flowing along the coast toward the cape. The rest penetrates between Agumiski and Neakwow, flowing on down the strait. At the same time, that portion of the main tide that had gone down the east shore of Agumiski, travels southward until it reaches the "Cock," and there divides in its turn, part of the water going on south to Moose river and part turning north, penetrating the Albany, flowing along the coast, becoming pursed up in the narrowing strait between Agumiski and the mainland, and finally meeting the northern half of the tide in the neighbourhood of the Manowinan islands. The results are: (a) Four high tides a day around the Manowinan islands; these come in pairs and the crest of each member of the pair is not far apart. That is, shortly after tide A has begun to ebb, tide B becomes full. (b) A tide race of considerable violence in the strait. The currents are so strong here that a sound of considerable depth has been hollowed out. This sound or deep channel lies close to Agumiski—about one mile off shore—and is about three miles in width. Between Lowashy river and the fur posts on the island a depth of 18 fathoms has been found and the average depth is said to be in the neighbourhood of 10 fathoms. The banks are quite abrupt and the water that flows through this channel is filled with various kinds of floating seaweed in great quantities. From the west bank of the sound towards the mainland the deepest water would probably be twenty feet, but that depth cannot be relied upon as it becomes rapidly shallower as the shore is approached.

The tidal currents here as elsewhere in the bay are too swift for a sailboat to make headway against, unless it has a wind from aft. In fact, a steamer with a speed of seven or eight miles an hour makes very slow progress.

From the diagram given may be seen the manner in which the wind affects the tides. A north wind blows the water into the bay and by thus aiding the tide, raises it and holds it up for a greater length of time. A south wind does exactly the reverse of this. A west wind too, delays and lowers the tide. During the past summer the steamer *Emilia* was fast on the Albany bar for over a week owing to gales of heavy west winds. At no time in that period did the tide, which usually averages $5\frac{1}{2}$ feet at that point, exceed three.

THE FISH OF JAMES BAY.

The various species of fish found on the west coast are as follows:—

1. *Acipenser Sturio* (Lin.) Common Sturgeon.
- Catostomidæ, Suckers:—
2. *Catostomus Catostomus* Northern or Long-nosed Sucker.
3. *Moxostoma Aureoleum* Common Red Horse.
4. *Erimyzon Sucetta* Chub Sucker.
5. *Hiodon Alosoides* Mooneye or Goldeye.
- Salmonidæ:—
6. *Coregonus Clupeiformis* Common Whitefish.
7. *Coregonus* Species uncertain.
8. *Argyrosomus Tullibee* Tullibee.
9. *Salvelinus Fontinalis* Speckled Trout.
10. *Mallotus Villosus* The Capelin.
11. *Esox Lucius* Common Pike.
12. *Stizostedion Vitreum* Pickerel (Doré).
13. *Perca Flavascens* Yellow Perch.
14. *Lota Maculosa* Fresh-water Ling or Burbot (Marl).
15. *Cottidæ Icelus Hamatus* Northern form of common Sculpin.
16. *Cottus Ictalops* Miller's Thumb (Blob).

On the Hudson's Bay watershed occurs;—

Cristivomer Namaycuch Lake Trout.

COMMON STURGEON.

It seems a contradiction in terms to state that the common sturgeon is not at all common, but such is nevertheless the case. It is caught, of course, regularly but nowhere in very great abundance; it is never caught in the sea but a few are taken every year in the rivers and river estuaries. The usual practice is to bait large hooks and to suspend a great number of these from a horizontal cord so that they are lying on the bottom. Sometimes, however, the sturgeon are taken in ordinary nets. In no case do the inhabitants use a special sturgeon net for these fish. The largest size reported was seven feet (a specimen taken in the North Albany) but the average is very much smaller, probably two feet, certainly not over three. It is generally considered useless to try for sturgeon during July and the first part of August but by the middle of the latter month, fishing is supposed to be good. It continues so until the late fall and begins again during the spring. The habits of the sturgeon on this coast do not differ from the habits of the same fish elsewhere.

THE SUCKERS.

The habits and life history of all these fish are too well known to need further comment at this point. They are not observed to enter salt water. They spawn in the spring, running up the rivers and small creeks for this purpose. Strangely enough, they seem to be scarce in the middle of the summer as if they had moved away from their usual haunts. In August, however, they return in great numbers and may be seen at any time moving along the shore close to the bank. They form a very important item of the food of the Indian and his dog since they are easily obtained. They are probably present in greater numbers than any other fish and doubtless the waters of the north would be more productive of valuable fish if some way could be found of removing them.

The third species mentioned whose identification is doubtful is a rather handsome fish of much less common occurrence than the other two. All the specimens I examined were under 12 inches in length. Their bodies are much compressed and

deep in proportion to their thickness. Their colour, which of course like that of all fish would be very variable, tends to a light metallic green above, with the fins reddish. Their scales are as large as those of the common sucker. Their lateral line is not straight but curved.

GOLDEYE OR MOONEYE.

But a few specimens of this fish, taken in the upper waters of the Moose river were met with. It is valuable as a food fish but very local in its distribution, being unknown in the Albany or Attawapiskat systems.

COMMON WHITEFISH.

The whitefish is found almost without exception in all the waters of the north. It abounds in James bay, although its movements are such as to cause its absence from large portions of that body for considerable periods of time. It averages not more than a pound and a quarter in weight and sixteen inches long. The largest individual taken this past summer weighed about four pounds and measured about 21 inches by 6 inches. It is said that in the head waters of the Ekwan river and also in the Trout river, there are places where they may be obtained two feet in length. These, however, are the largest of which even the oldest Indians have ever heard so that it is safe to say that the whitefish of James bay do not grow to the size of that of the Great Lakes.

The movements of the whitefish are as follows:—When the ice leaves the rivers in the spring, the fish are found in great quantities; fishing continues good for about a month or until the first part of June. As the sun gets hotter and the water warmer, the fish disappear until in July there is scarcely a fish to be obtained in any estuary along the west coast. This absolute dearth continues until about the middle of August, at which time the whitefish come back. This return takes place quite quickly, as a few days will suffice to fill the tidal estuaries with fish. The time of the return, of course, depends on the season; a fine summer prolongs the period during which there are no fish and a cold one shortens it. The fish seem to come back to the whole west coast at the same time. Thus when the fishing becomes good at Opinegau river, two hundred miles north of Albany, it also becomes good at Albany. One might expect that since the northern water gets colder before that further to the south the fish would return to it sooner, but such does not seem to be the case. Evidently conditions in their summer home—which may be in the depths of Hudson bay or may be merely out in the deep water of James bay—determine their return and not the local conditions of the west coast.

When they come back they are all very fat and many carry eggs or milt. These latter are, however, in the minority and are always the larger fish. Although I examined a great number of specimens I was unable to find one less than 16 inches in length or 1½ pounds in weight which was prepared to spawn. The fish under this size evidently come back to the rivers merely in accordance with the same migratory instinct that leads them back as adults to spawn. I found numerous specimens, too, quite unprepared to spawn that were as large as a good many of those that were ready to spawn. These whitefish or "Atikameg" as the Indians call them, are taken every fall in vast numbers from about four inches in length upward to the sizes named before.* The immature fish congregate in vast schools in the river estuaries and are commonly taken with the seine nets. As in the case of herring, they come suddenly and make their presence known by "skipping" on the surface of the water. Usually fish of about the same size keep together; thus in September the seine will capture individuals averaging three-quarters of a pound in weight and about 12 inches in length; later on the size

* See section of report dealing with individual fisheries.

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most commonly taken is 7 inches. The fishing continues extraordinarily good until about the last of October when as a rule the rivers freeze. During the winter but little fishing through the ice is done; at least as there are no Indians around the posts and as the companies have already secured their supply of fish but little is done around the posts and in the river estuaries. It is thus impossible to state whether the catch would prove as abundant during that season as at the other periods mentioned. The fact however that there are plenty of fish in the spring just after the ice leaves goes to indicate that the fish remain in the rivers all winter.

Spawning takes place in October or late September; the spawning grounds are usually but a few miles up the rivers; that is, the spawning grounds of most of the fish; very probably a good many penetrate further, this apparently being the case on one river, at least—the Ekwan. The depth of water does not seem to be uniform, but is never more than a couple of fathoms.

The most interesting problems about the James bay whitefish are thus: (1) The annual return to fresh water of vast numbers of immature fish; (2) the disproportion between these and the mature fish; (3) the whereabouts of the fish in the summer. To solve this last problem a deep sea expedition is necessary. They are not present near the shores of the bay as none can be found at Agumiski island until the return to the rivers takes place. At that time they are not only abundant in the estuaries but are found along the coast in fair quantities also. As whitefish are taken pretty regularly at Stratton island all summer, the probability seems to be that they frequent during the summer the deeper and colder waters of the east coast.

SECOND SPECIES OF WHITEFISH.

With the exception of one or two well differentiated species, the existence of different kinds of whitefish in bodies of water even so well known as the Great Lakes is still more or less a matter of controversy: scientists are unable to decide whether certain forms are only varieties of the common kind or whether they are distinct species. As a second species of whitefish has been from time to time reported from James bay, it is mentioned here but it must be stated that if this second species does exist, it differs in its habits in no observable manner from its better known relative. None of the Indians recognize a second species. The only observable difference in the whitefish in the bay lies in their shape. In some there is a pronounced "hump" on the back as in the whitefish of the lakes; these fish are inclined to be short and deep. In others there is no "hump" and they are inclined to be longer, thinner and less deep than the first kind. Of five males examined, two were plainly the common whitefish, three lacked the latter's characteristic "hump." Of eight females examined, three were common whitefish, five lacked the "hump." In addition these latter had rather sharper jaws than the former. As no specimens could be brought back it is impossible fully to decide the matter.

TULLIBEE.

This fish is distinguished from the whitefish by its projecting lower jaw and by its softer flesh. It grows to about 18 or 20 inches in length and reaches a weight of three pounds. In every feature except its size it is similar to the herring of the Great Lakes. Its movements correspond exactly with those of the whitefish and the two species are always found closely associated. It is said not to resemble the tullibee of Manitoba very closely. The smallest specimen examined was 8 inches in length; this fish, in the beginning of September was filled with eggs which were in a condition to be shortly deposited. All others examined were in the same condition. From the first few days of August until the first of September a distinct development was noted in the egg masses. The eggs themselves became larger and harder, the ovaries more richly

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supplied with blood. All during this period the fish were very fat (as were also all the whitefish taken). Tullibee and whitefish were caught in about equal numbers both in the seine net and in gill nets. Tullibee are usually reported as spawning in the latter part of October but on September 10 in the North Albany river I took a couple of specimens which had apparently already spawned; they had lost all their fat and contained no milt. Still it is hardly to be expected that the spawning season should be so much earlier in James bay than elsewhere even taking into consideration the latitude and the very considerable difference in season.

The females outnumber the males in a proportion of about three to one. The average size would be about twelve inches long and the average weight about three quarters of a pound. Large specimens are however by no means uncommon. The flesh is excellent if used very shortly after the fish is caught but if it is allowed to remain for any time—even overnight—it deteriorates and becomes soft.

SPECKLED TROUT.

The range of this fish extends over the whole western James bay watershed from Albany north; it is also found in the lower reaches of the Moose river. It is not, however, very common in the Albany or in any of the more southern rivers, but abounds in all the rivers and creeks from Mourning point northward. The largest river in which it is found abundantly is the Opinegau. It is reported that it increases in numbers as one goes northward and that some of the rivers of the Hudson bay slope, notably the Trout and the Winisk, are filled with it.

Its movements coincide almost exactly with those of the whitefish and tullibee; it disappearing from the fresh water and the coast when the water becomes warm, returning later on to spawn when the temperature is falling. Unlike the whitefish, the autumn migration does not comprise immature individuals who merely accompany the adult fish; all the fish that return to the estuaries come back laden with eggs and milt and ready to spawn. The average female carries about 2,500 eggs.

The Indians usually calculate on the return of the fish occurring about August 10. August is known locally as the "Trout Month." All the rivers and creeks along the northern portion of the coast are of the same character; at the mouth they are mere beds of stones and mud when the tide is out, and usually very wide. When the tide comes in, it fills them up for several miles from the mouth and makes them look like rivers of a very fair size. Higher up they narrow down, the banks become steeper and they have a fair depth of water. As they approach their head waters they run over bedded limestone and at those places considerable rapids occur. The speckled trout enter these streams and for a considerable time remain in the estuaries; gradually they advance farther up until by the latter part of September when spawning takes place they have reached the rapids. In the swift water there, they deposit their eggs. After spawning they distribute themselves throughout the stream or river and in the winter may be caught at almost any point through the ice. When spring comes, the time of open water finds them again on their way to the sea and by the middle of June they have disappeared into the deep water once more. A few stragglers, however, remain in the rivers throughout the summer and these fish may be caught in certain places at any time. Some people assert that the fish of certain rivers—notably the Opinegau—acquire a swampy taste late in the winter; if this be true it will detract considerably from their food value.

The average size of the "Masemaygus," as the Crees call the fish, is about 16 inches in length and a pound and a half in weight. The largest specimen was taken in one of the southern rivers where they are not usually very common, and weighed 5 pounds. No fish could be better eating; their flesh is a salmon pink or sometimes yellowish. With their brilliant colours of red and bluish, their shining bodies fresh from the salt water, they are most attractive in appearance. Although the speckled trout of the north is a most valuable and interesting fish.

THE CAPELIN.

This little fish is found along the shores of the west coast and especially at Agumiski island. Its life history is well known and its habits do not differ in the bay from those of its kind in other bodies of water. It is often found in considerable quantities. It spawns along the shore preferably in the surf and during rough weather. A good description of this process as well as other interesting facts in regard to the capelin is found in Goode's "*American Food and Game Fishes*."

THE PIKE.

This fierce, submarine pirate dominates the waters of the north as he dominates all other localities in which he is found. Fortunately, he is confined to the fresh water so that his ravages must for the most part be directed on the less valuable kinds of fish. However, during the autumn when every creek is filled with toothsome morsels the destruction he works must be terrific. He does not seem to grow to the enormous size that he sometimes attains elsewhere, neither is he present in as great numbers as in other bodies but he is always hungry and always combative. The largest specimen taken weighed about 7 pounds, the average was about 4. The pike is a food fish of considerable value if cooked properly, especially the fish of larger size. He is about the easiest of all fish to catch as he may be taken by almost anything that glitters, whether on a troll or an ordinary "hook-and-line." The pike spawns in the spring. He retreats from the tidal estuaries during the summer months, preferring the upper reaches of the rivers; one reason for his course of action is that there he probably finds more food; the estuaries are devoid of fish at this time, most having gone out to sea, but a few up river there the pike goes after them. It is a pity that some plan could not be worked out whereby our waters could be cleared of such fish, for the destruction they entail among food fish must, every year, be enormous.

THE PICKEREL (DORÉ).

The pickerel is a member of the perch family and as such has an important position in the list of food fishes. It is locally known by the servants of the Hudson's Bay Company as the "Perch," this name doubtless being due to the resemblance it bears to the perch of the British isles from whence in bygone days the name has been carried. The pickerel is met with abundantly in the waters of the Albany system, in those of the Attawapiskat, the Kapiskau and the Ekwan. It doubtless occurs in the rivers of the north half of the coast also but no specimens were taken in them during the past summer. The largest obtained were two taken in concert with Mr. Melvill on the Metagami river. These weighed 8 and 9 pounds each. The average would be about three pounds and a half or a little more.

The pickerel does not enter the salt water, but seems at home in the tidal estuaries which often become a bit brackish. It, like the pike, is most abundant during the cold months and its flesh is then in better condition; of course it is always good eating but in the autumn and spring it may be kept longer before cooking. It spawns in the spring. It not only is a good food fish but provides good sport when taken on a troll. Its spiny dorsal fin when erected makes an efficient weapon of defense and unless its captor exercises care, he will pay for his prize with a lacerated hand. The pickerel is almost as voracious as the pike, disdaining very little in the shape of food that comes near it.

YELLOW PERCH.

This well-known little fish is found in the upper waters of the Albany system, in limited quantities. I have not heard of its being found elsewhere, though it is quite possible that its range extends to the other near-by river systems. The perch spawns

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in the early spring, depositing its eggs in a long, semi-transparent strip of sticky mucus. It never exceeds a pound and a few ounces in weight and twelve inches in length. As a food fish it ranks high, some people considering it of as good quality as the pickerel and both of them as superior even to whitefish or trout.

FRESH WATER LING ("MARI").

This fish is well distributed over Ontario and is found in all the waters investigated last summer. It has a hundred different local names; thus in Michigan it is known as the "Lawyer"; in southern Ontario, the people of the inland lakes call it the "Dog-fish"; in the north, it is almost universally called the "Mari". The Indian name is "Malaskachoosh". It is the only fresh-water representative of the cod family and shows its affinity to that valuable stock by possessing an enormous liver which is of considerable food value. The flesh of this fish is sometimes eaten but he who has once tried it will not readily do so again; the fish is not only disagreeable to the taste but also repulsive to the sight. The flesh, especially the liver, is said to improve in winter. It is of importance to the Indians as it may be taken at almost any time.

It is a bottom feeder and as such possesses the wide mouth equipped with feelers that most fish of this type exhibit. Its head is flat and its body tapers rapidly to the tail. It has no rays in its fins and is scaleless, the skin being covered with a coat of slime. A large one is two and a half feet in length, an average one about twenty-two inches. They are caught quite commonly on lines set for sturgeon. Spawning takes place under the ice in January. So far as known, this fish is exclusively restricted to the fresh water.

SCULPIN.

This fish is known as the "Anotinamek" by the Indians—a word probably meaning "wind-fish", perhaps because of its curious habit of puffing out its cheeks as it breathes. It never exceeds 14 inches in length. It is covered with spines about the head and has two rows of small horny plates down each side of its back; these plates or scales number about twenty-five. Its pectoral fins are very large and are mottled yellow and black. Its ventrals consist of three soft rays. The sculpin is usually considered a scavenger but the stomachs of the specimens examined were for the most parts filled with small slugs. Some specimens were badly infected with worm-like parasites. The sculpin is said to make its home almost entirely in the sea but those found were taken in the mouth of a river and one or two specimens a good way above salt water though not beyond the tide. They are not very numerous and beyond the fact that their liver is eatable and that their fleshy tail is sometimes eaten—especially by the Esquimo—they are of little economic importance.

MILLER'S THUMB.

But one specimen was taken of this fish and that was a dead one picked up in a pool on a rock in the Metagami river. It is very small and not important. Its range may likely extend farther to the north as it is very likely to be overlooked or taken for the young fry of some other species.

LAKE TROUT.

Reports of huge fish inhabiting the waters of the Trout river and Sutton Mills (or "Trout") lake are very common. All the Indians who have been in that region assert that these fish are half as long as a man and that in nets of the largest mesh they are only caught by the teeth. While accepting such tales with a considerable degree of doubt we may be reasonably certain that large fish exist in those waters and

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as all agree in saying that they are trout of some sort it is fairly safe to put them down as lake trout. The waters of the above named lake which are very deep and clear and cold would be well fitted for this fish. It is said to occur in exceedingly large numbers.

ROCK COD.

This fish is not included in the list given of those specimens found on the west coast because there is no record of it ever having occurred there. While the writer was at Stratton island, however, which lies in the deep, clear-water part of the bay, he ascertained that rock-cod were taken there in abundance. The report of the expedition up the east side of the bay will doubtless contain information in regard to this fish.

OTHER MARINE LIFE.

WHITE WHALES.

The white whale (*belunga catadon*, Gray) is very common. Its range extends through the Bay and it often enters the rivers. It grows to a very considerable size and is fairly approachable. It is useful for its blubber, hide and flesh. The Indians make great use of the flesh for dog food but they do not eat it themselves "except in case of necessity". An average whale yields 100 gallons of oil and is worth, all told, about \$15. As the supply of them seems to be unlimited they are a very valuable resource. It is by no means an uncommon sight to see fifty or a hundred of them from the deck of one of the small schooners used in that country. As a general rule it may be said that they are more common in the northern part of the bay than in the southern.

SEALS.

Seals are not very common on the west coast but occur with enough frequency to furnish the natives a fairly constant supply of hide for bags, gun covers and so on. They often come into the river mouths and it is here that they are usually secured. The only means taken of obtaining them is by shooting them; as they are heavier than water, they often sink before the canoe containing the hunters can get to where they are. How wasteful this process is may be judged when it is known that but only one out of four or five killed is ever secured. I did not have an opportunity to see any at close range but from what I could learn there are two species that frequent the west side—the grey seal (*halichoerus grypus*) and the common seal (*phoca vitulina*). The walrus is also taken very occasionally but only in the extreme northern parts. It is not known whether the seals produce their young on the west side or whether they are mere visitors from the east coast.

CRAYFISH.

In all the river estuaries a single specimen of crayfish is found. It is about 5 inches in length and of a blueish colour. One of the gentlemen of Révillon Frères makes use of them for food purposes and says he finds them very palatable; he catches them by means of a small net stretched on a hoop on which are spread bits of meat or fish. They are most commonly taken in about eight feet of water.

IN GENERAL.

The most interesting condition in regard to the fish of the west coast is that although all the conditions of the sea are present, practically all the fish found are fresh-water species. The capelin and the sculpin are the only exceptions to this rule, and neither of these fish are of very much economic importance. One finds all the Salmonidæ taking on migratory movements of the most distinct character and gradually transferring the main phases of their existence from the fresh water which is their

natural home to the salt. If it were not geologically certain that James and Hudson bay always have been salt and connected with the ocean as at present, one would be inclined to think from the fish life present that they had originally been bodies of fresh water which had become salt and that in the process the fresh water fish had adapted themselves to the salt water conditions. Even were we to examine the fish life of the whole Bay, but few conditions would present themselves in contradiction to such a theory. The only salt water fish of much note throughout appears to be the rock cod; all the most important ones are really fresh water fish. And yet there is unlimited access to all the species that frequent the north Atlantic. One wonders how it is that they do not come in and take up their abode in the Bay. Gunther in his *Introduction to the Study of Fishes*, remarks in this connection: "The sturgeons and salmonids evidently belonged originally to the fresh water series, and it was only in the course of their existence that they acquired the habit of descending to the sea, perhaps because their fresh water home did not offer a sufficient supply of food. These migrations of fresh water fishes have been compared to the migrations of birds, but they are much more limited in extent and do not impart an additional element to the fauna of the place to which they migrate as is the case with birds." . . . "There is a constant exchange of species in progress between fresh water and marine fauna, yet certain groups have apparently been, during the whole course of their existence inhabitants of the one or the other. . . . A genus of fresh water fish is regularly dispersed and most developed within a certain district, the species and individuals becoming scarcer as the type recedes more from its central home." At that time then, when the sturgeons and salmonids of the north had not adapted themselves to the salt water the whole vast stretch of the west coast must have been without fish life.

The manner in which those fish have distributed themselves is problematic. The whitefish, of course, is found almost throughout Canada; I do not know of another locality, however, in which it enters the sea so freely and its movements also have a regularity which is unusual. Something parallel to them occurs in Lake Erie where it moves from the deeper water in the eastern end of the lake in spring up on to the "platform" at the western end; during the summer, it retires to the deep water again returning in the fall once more to the shallows, this time to spawn. A large body of fish is always to be found in the deep water even during the spawning time, but there is no evidence that these fish spawn there. This large body of non-spawning fish may correspond with the immense number of immature fish that enter the tidal estuaries of James bay in the fall. In lake Simcoe, so far as is known, the whitefish frequent the deep parts of the main body of the lake in summer and during the late fall or winter move up into the bays near shore where they are caught through the ice; they move out again in the spring. One would hardly expect river fish to have such migratory movements and, as the James bay whitefish would hardly acquire such movements if it had merely adapted itself to the salt water after having lived a river existence, it is reasonable to suppose that these fish found their way into the bay from some other point. Gunther says on this subject: "Since salt water often proves no barrier to fresh water fish, their distribution has probably been in some cases from river mouth to river mouth through the sea."

Speckled trout are known to enter the sea in other localities so that it is not a matter of surprise to see them doing so in this case. Frank Forester, an author of a work on American fishes refers to their anadromous habits as follows: "The brook trout run down and remain permanently in the sea, more or less, along the whole south side of Long island and probably at many other points along the eastern coast." The only eccentric feature in regard to them is the manner in which they are distributed; at Moose Factory, there is only one stream of the entire system that contains them (Doctor's creek); there are only a few in the rivers and streams south of Mourning point but north of that spot, although there is absolutely no change in the character of the country, they are more abundant than any other kind of fish. There seems no good reason for this.

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At the time of the return in the fall, the fish, especially the whitefish, appear to eat next to nothing. Many stomachs were examined but very few contained more than a little gravel. Trout, during the summer are fond of the larvæ of the dragon fly; stomachs examined at that time contained large numbers of these insects.

While by far the most of the fish make their summer home in the sea, there seem to be others which live permanently in the rivers. Whether any distinct line could be drawn between sea-going fish and river fish of the same species is not known but the individuals of the two classes are not hard to distinguish. For instance at the time of their return, the whitefish present a shining, silvery appearance, brown or greenish or bluish on the back and splendidly clean and white; the whitefish that have stayed in the rivers all summer, on the other hand, are duller, not as attractive in appearance, their backs tinged with yellowish, they dry up more quickly and lack the silvery glitter of the sea-run fish. Whether, however, these fish never enter the sea or whether they are mere stragglers whom chance has detained for a summer is yet to be determined. It is quite certain that fish of all the sea-going species do stay in the rivers all summer and in some cases and some favorite localities in considerable quantities.

FISHERIES INVESTIGATED.

1. NAGEDOWZAKY RIVER.

This is a small stream that flows in about fifty miles south of Cape Henrietta Maria; it is very shallow at the mouth and fishing boats could only enter at high tide. On August 3, when I was there, the Indians were catching fair numbers of trout in their small nets, which they had set in pools, a couple of miles from the mouth. Whitefish were also being taken but the prevailing opinion was that the season was too early for the best fishing, as the water had not yet got cold.

2. OPINEGAU RIVER.

On the banks of this river, about five miles from its mouth are situated the last outposts of the fur-companies. About seven miles up is a deep pool in which the fish congregate in the winter, at which time the trout may be taken, in unlimited numbers, on the hook. Farther up still, are other such places. The river at the fur-posts is about fifty yards wide, rather sluggish and perhaps, six feet in depth. It broadens out so much as it gets near the sea that sailboats are unable to come up it more than a mile. The trout that are caught in this and the other small streams nearby furnish the staple article of food for the thirty families of Indians that make the region their hunting ground.

The expedition arrived there at the end of July, at which time a few trout were being taken every day. We caught a few ourselves in nets that we had placed well out to sea. When we returned on August 4, more trout still were being taken besides quite a few whitefish and the nets were not being placed quite so far out as before. All fish taken were ready to spawn that fall. It was the opinion of all the Indians with whom I conversed that the real autumn run had not commenced at that time and would not commence until the tenth or twelfth of the month. We took a few more fish ourselves, the number being about equally divided between trout and whitefish.

Other northern streams, Chickeney, Lowashy, the Kenopwenik and the Black Duck, besides a few smaller ones of less importance, yield trout in about the same quantity as the Opinegau.

3. SWAN RIVER.

This is an unimportant stream about midway between Opinegau and the Ekwan. It contains a few pike and suckers but no other fish of value resort to it.

4. THE EKWAN.

The Ekwan enters the sea about 30 miles north of the Attawapiskat; the mouth is surrounded by shoals and low grassy islands. Boats of 3 or 4 feet draught can get up a short distance. The peculiarity about the Ekwan is that the fishing is never very good at the mouth while at points higher up, the largest whitefish in the region are said to be taken. These points are chiefly two: one 100 miles up stream, in a deep pool, the other 200 miles up in another pool. As the Ekwan has only one small portage in all this distance it is not difficult for fish to make their way up it. The whitefish said to be taken that far inland are commonly reported to be 2 feet long and 7 inches deep; that is, they would weigh probably six or seven pounds.

5. ATTAWAPISKAT RIVER.

The information that I collected about Attawapiskat fish from others' reports and from my own observations is as follows:—

Sturgeon: This fish is not abundant. There are favourite spots for it such as at the so-called rapids two miles below the settlement. At these places sometimes two or three of a night are taken by one fisherman. They in no case exceed 3 feet in length.

Suckers: There is no limit to the numbers of suckers that may be obtained, both the common, or northern sucker, and the red-horses. They are usually caught at all times of the year but in much greater quantities during the spring and fall than at other periods. They form the chief summer food of the innumerable husky dogs about the place.

Common Whitefish: We arrived at Attawapiskat on July 9 and immediately put out our nets. We were rewarded with, among others, one whitefish. That sufficiently indicates the state of things during the summer. When we came back, we fished from August 17 to August 20 and had little better luck. This is not to state that no fish are to be found at Attawapiskat but rather that we were not there at the right time.

The water off the Attawapiskat is very shallow and thus very warm, also the season was particularly fine, and most likely the whitefish stayed out in the sea longer than they do most years. There were signs that they were beginning to come in when we left; our own catch had increased slightly and the number of Indian nets being put out was very much in excess of what it had been earlier in the summer. Then, too, the French company officials at this place depend on the whitefish catch for the winter food supply of their dogs. The usual practice is to seine in certain well-known localities late in the season—as short a time before the freeze-up comes as possible. This is done because the fish are kept in a frozen state all winter and of course are ruined if they are not so kept from the first. It often happens thus that seining, in waiting for the steady cold weather, is left too late and the ice catches the fishermen unawares.

Seining Dates: The seining dates for 1912 were from October 9 to October 25. For 1913 they were from October 20 to October 25. The freeze-up in these years was October 26 and October 28 respectively. The best catch reported is a canoe load in three hauls of a 100-yard seine. A canoe would probably hold about 600 pounds of fish. Annually the company's officers aim to put down about 100 tubs of fish, a tub containing 100 pounds. This amount of course includes suckers, but not very many in the average year. The whitefish obtained in this way average about 15 inches in length and a pound in weight. They are not as small as those taken at Albany and known at that place as "seine fish." They do not seem to congregate in such large schools as do the Albany fish.

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Tullibee are not differentiated from the whitefish in all the reports I have received. My own observations show that at this river they are about as numerous as the whitefish.

Trout: Speckled trout are rare in this shallow, dirty river; a few are caught every season but not enough to make their capture a commercial proposition. Reports of "salmon trout" occurring in this river may be due to the capture of occasional lake trout; these fish I never saw myself.

Pike and Pickerel: These fish, while not abounding are caught regularly, except in the middle of the summer when they seem to seek haunts that are as yet unknown to their would-be captors. Any net put down at other times is sure to contain a few of them; sometimes the pickerel are of good size; they are always good eating.

Mari: The above remarks will apply to this fish also, with the exception that it is to be taken at any time of the year. It is not valued when anything else can be obtained.

6. THE COAST.

A few whitefish are taken on the coasts all summer in nets set as described above. When the water increases in cold the fish increase in number. A fisherman could be sure of getting about 5 pounds of fish to 10 fathoms of net all the time and considerably more than this in the fall. The deeper the water he fished in the larger would probably be the supply of fish. At Agumiski island however, where the writer was in the middle of July, there were no fish to be obtained, though the huge number of netsticks along the shore, bore testimony to the fishing activities of the autumn. The presence of a fair number of seals, too, a few miles off the coast and of hundreds of white whales, besides constituting a valuable resource in itself, indicates considerable quantities of fish. At Neakwow point, where the dividing tides have worn out a deep channel close to the bank, much fishing is done in the fall and whitefish can be obtained most of the summer. From descriptions of the Gasket shoal, I should fancy cod might be found there, but the skipper of the *Emilia* tells me he tried for them there on one occasion, without success.

7. LOWASHY RIVER.

Lowashy has the distinction of being considered the one river along the coast where plenty of fish may be obtained at any time. Indians, who ordinarily live at Attawapiskat during the summer, visit this river for a few days at a time in order to load up their canoes with fish, smoke them and take them back to Attawapiskat. And as there are about 400 Indians living at the latter place, each of whom can consume incredible quantities of fish, the demand made upon Lowashy is not small. The party visited Lowashy on July 7 and though it was impossible to set our nets well owing to the swift tide, we got many more fish than up to that time we had at any other point along the coast. On our return in August (22), we discovered a quiet spot about three miles from the river's mouth which was reputed good for fish. At this place we obtained a very good catch, consisting mainly of whitefish but with a few good pickerel; the Indians who were camped near us, were at this time also getting good catches regularly. As there are innumerable pools and backwaters among the islands that lie in the mouth of this river, I should fancy that a constant and fairly large supply of fish could be obtained here. I should add that the largest trout we took during the summer and about the largest that is ever taken—5 pounds—came out of this river. The south bank projects about two miles further out to sea than does the north bank—this may act as does the leader of a pound net and thus account for the constant supply of fish.

8. KAPISKAU RIVER.

This river lies about 60 miles north of Albany. It has been described under "Harbours." Owing to our ignorance of the good places, when there in July, we were forced to set our nets in the open current. As the river carries down a great deal of

debris after we had got them put out with a good deal of difficulty, they became very dirty. We did not get many fish at that time. When we returned in August, we were informed of a good place about 7 miles up-stream. Putting our nets down there, we soon had them filled. Four or five whitefish would be in the net in the time that elapsed from setting it to going back over it and straightening it out—a matter of a few minutes. Most of these fish had come up to spawn but there were a good many of the whitefish that had no eggs in them—roughly, all under 15 inches long. Tullibee were about equal in number to the whitefish. We also caught more pickerel here than we had at any other point up to that date. Suckers and pike were also common. In two days from the same pool, out of which we mainly fished, an Indian in the fall of 1913 got 400 whitefish in two of the little nets used by these people. We tried our seine at various points on the river bank but met with little success. Seining has never been done in this river but it is altogether likely that if the right places were found, it would yield just as well as do the other good 'seine-fish' rivers.

9. ALBANY RIVER.

To deal with the upper waters of this huge system first, let me set down the information I acquired at English River post. At this place, four large rivers come together; the banks of all of them deepen very quickly from the shore and they are all very swift. In the Nagogami, which is one of them, just below the rapids, in the spring the Indians are accustomed to get two or three sturgeon of a night. The longest on record is 5 feet. Around the "Mattawa" or confluence, an occasional sturgeon is obtained all summer long. At this point also they get large quantities of suckers and pickerel in the fall, but during the summer the fishing is very poor. I saw the results of a gill net set opposite the post for two days; the catch was one trout, one whitefish and several suckers; this was in the third week of June. But very few whitefish are found here at any time of the year. Trout are captured more often though never in large quantities; the maximum size is seven or eight pounds (speckled trout).

At Martin's Falls post which is located at the first portage on the Albany, about three hundred miles above Fort Albany, it is reported that they take very large quantities of tullibee and whitefish in the fall; it is possible that these are sea-run fish as up to that point the Albany offers no impediment in the way of rapids for fish that wish to ascend it.

Albany Estuary.

The mouth of this splendid river is the scene of the greatest fishery on the whole of the bay, but like all the other waters of the west side, the time of that fishery is limited to the fall and spring. All the kinds of fish caught elsewhere are also obtained here, although the trout and the sturgeon are not abundant. The best sturgeon catch is three or four in a night and the largest one on record measured 7 feet and was taken in the North River. The fish wealth of Albany consists almost wholly of whitefish and tullibee. Pickerel and pike are caught in probably greater numbers here than elsewhere on the coast and the former are usually above the average in size. As in the other rivers, there are certain favourite fishing places and it is in these that practically all the fishing is done. The most usual place for nets is directly opposite the settlement, on the south side of the long, low island lying opposite to it. Another good place is on the south channel of the north river, out beyond the tree line. Seining is usually done in "Fishing Creek" which enters the main river about opposite the posts of Revillon Frères: this creek of which about one mile may be ascended in the canoe, is also usually pretty well filled up with

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Indian nets. It is at the limit of tide water on this creek that the seining is done. The place where our party had its best luck was not Fishing creek but a small bay one mile above the village at that point, we several times obtained seventy-five pounds in one haul of a 90-foot seine. Large hauls have also been made at other points; as for instance last fall (1913), Revillon Frères obtained one of the largest single hauls that have ever been made (3,000 pounds) immediately in front of the warehouse, where every "old inhabitant" of Albany predicted that no fish could be caught. If it has been a rainy season or if the water in the river is unusually high a poor catch generally results. Sometimes too, the frost comes and catches the fishermen unawares, it being the aim here as at Attawapiskat to leave the seining as late as possible so that the fish will remain frozen from the time they are taken out of the water.

August 15 is given as the date of the commencement of the fall fishery. The fish are usually first procurable out towards the mouth of the river and gradually work in. When we arrived on September 2, every Indian was taking many pounds of fish every time he lifted his nets. The catch at this time is about evenly divided between whitefish and tullibee. All the fish without exception are very fat and in splendid condition.

The average size taken in our seine was 12 inches in length and three quarters of a pound in weight; the average taken in the nets would be larger than these. The tullibee were all ready to spawn but only the very largest whitefish (those over 16 inches) were. Every body assured me that the characteristic "seine-fish," as it is locally termed, had not yet arrived in any number. These fish come about the 1st of October and make their presence known by the flipping of their fins, of a bright day, on the surface of the water. They are much smaller than the ordinary whitefish caught, averaging not more than 6 inches in length. They travel in vast schools so that if the fishermen once locate the school, they are a very short time in getting as many fish as they want. The greatest cloudiness of ideas prevails in regard to this fish; many Indians will say that it is a different kind of fish from the others, being although small, mature and coming to spawn; others maintain that it is just an immature whitefish and returns, following the adults which come to spawn. I caught many small whitefish, ranging in size from 3 inches up, all of which all the Indians who saw them, declared to be the regular "seine-fish." It is hardly probable that, if the "seine-fish" be another species, either some individuals would not have straggled in by the time I left Albany, or those people who saw the small whitefish I was getting would have named the latter "seine-fish." The only possibility of another species occurring is that the so called seine-fish may be a species of lake herring; but as the Indians all recognize the slight distinction between the whitefish and tullibee, they would be almost sure to recognize the same difference between the immature whitefish and another fish. It seems highly improbable that the "seine-fish" is anything but an immature whitefish of one or two years growth.

Spawning takes place in the ends of the creeks and shallows about Albany. One of the spawning places is in the creek that enters just below the "rapids," about three miles above the post. At Chickeney, where many whitefish resort to spawn, the operation takes place about two miles from the sea. Besides all the fisheries mentioned almost any one of the numerous small creeks along the coast is resorted to in fall for spawning purposes.

DETAILS of the fall fishery at Fort Albany. 1 tub—100 pounds of fish; seine used; 100 yards in length. From the records of Messrs Revillon Frères.

Post established 1903.

Year. Tubs.	Year. Tubs.	Year. Tubs.	Year. Tubs.	Year. Tubs.	Year. Tubs.	Year. Tubs.
1907.	1908.	1909.	1910.	1911.	1912.	1913.
Oct. 15 7½	Oct. 17 2	Oct. 15 21	Oct. 18 1	Oct. 16 33	Oct. 10 24	Oct. 20 0
" 16 0	" 19 8	" 16 15	" 19 9	" 17 46	" 11 40	" 21 1
" 17 24	" 20 10	" 18 0	" 20 ½	" 18 42	" 12 19	" 22 2
" 18 0	" 21 26	" 19 0	" 21 42	" 19 21½	" 16 14	" 24 0
	" 22 28	" 20 8	" 22 14	" 20 3	" 17 35	" 27 1
	" 23 30	" 21 22	" 23 40½	" 21 18	" 18 9	" 28 30
		" 22 14	" 26 51	" 23 8½	" 19 10	
		" 25 39	" 29 0		" 21 20	
		" 26 20			" 26 24	
		" 27 28			" 31 6	
		" 28 73				
4 31½	6 104	11 232	8 158	7 172	10 201	6 34

Totals—Days and Tubs.

Results in Pounds.

Year.	Total Pounds.	Best Catch.	Date.	No. of Days.	Average Catch per day.
1907.....	3,150	2,400	Oct. 17.....	4	787½
1908.....	10,400	3,000	" 23.....	6	1,733
1909.....	23,200	7,300	" 28.....	11	2,200
1910.....	15,800	5,100	" 26.....	8	1,975
1811.....	17,200	4,600	" 17.....	7	2,457
1912.....	20,100	4,000	" 11.....	10	2,010
1913.....	3,400	3,000	" 28.....	6	566
	93,250			52	1,793

Earliest date, October 10, 1912. Latest date, October 31, 1912.

From the records of the English Mission:—

Mission Established, 1858.

Year. Tubs.	Year. Tubs.	Year. Tubs.	Year. Tubs.
1900.	1901.	1902.	1903.
Oct. 15 } 20	Oct. 23 2	Oct. 20 22	Nov. 4 51
" 22 } 20	" 24 7	" 21 11	
" 29 25	" 25 32	" 22 11	
" 30 23	" 26 1	" 23 21	
	" 28 40	" 24 9	
	" 29 19		
7 days 100	6 101	5 74	1 51

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RECORD IN POUNDS.

Year.	Total.	Best Catch.	Date.	No. of Days.	Average Catch.
1900.....	10,000	2,500	Oct. 29.....	7	1,428
1901.....	10,100	4,000	" 28.....	6	1,683
1902.....	7,400	2,200	" 20.....	5	1,480
1903.....	5,100	5,100	Nov. 4.....	1	5,100
	32,600	19.	1,716

Earliest date, October 15, 1900. Latest date, November 10, 1900. (Record incomplete for that year).

Hudson Bay Company Post Established, 1675: I am not at liberty to publish in detail the records of the Hudson Bay Company, but the general information I acquired about their operation is as follows:—

They have been seining ever since they have had a post there and the catch shows no appreciable falling off from year to year. They usually put down about two hundred tubs, invariably all of which are the small whitefish described above. During the last four years, there have only been four days on which they have seined without result. The catches have varied all the way up from 50 pounds a day to 6,800. The following figures, while not official, are reliable:—

Year.	Total Pounds.	Best Catch.	Date.	No. of Days.	Average Catch.	Dates.
1910.....	16,000	2,700	Oct. 22.....	10	1,600	Oct. 15-28
1911.....	24,400	5,500	" 26.....	11	2,218	" 13-25
1912.....	23,300	6,800	" 25.....	12	1,942	" 14-30
1913.....	7,650	2,100	" 27.....	8	956 $\frac{1}{2}$	" 17-29
	71,350	1,740

*The catch by Revillon Frères in 1914 was 12 tons (240 tubs). This was all taken in a few days. The largest catch in one day was 86 tubs, taken in three sweeps of the seine. All that prevented a much greater haul was the size of the boat used. In one sweep 42 tubs were taken. All this fish was whitefish. The Hudson Bay Company obtained about the same amount. The River Albany froze on November 5th.

Totals for all three:—Total pounds, 197,200; total years, 15; average per year, 13,147 pounds. Greatest catch recorded, 1912, 43,400 pounds. Poorest catch recorded, 1913, 11,050 pounds.

The old figures of the mission reduce the average a good deal.

Catholic Mission, Established about 1904: Besides all the above, the Catholic mission also seines every year; its catch is reputed to be about 15,000 pounds, but a great many of these are suckers caught in the channel known as the "Gutway." Still the whitefish there taken would probably easily make the average of whitefish for all Albany, annually, 18,000 pounds.

GENERAL INFORMATION FOR FISHERMEN, SAILORS, ETC.

WEATHER CONDITIONS.

Spring may be said to begin in earnest at the south end of James bay (Albany) about the last week in April. By the middle of May, the river is usually free from ice and the snow has gone. Snow storms, however, occur in an

irregular fashion much later than that date and it is no unusual thing to see snow falling in small quantities late in June. The rivers all break up suddenly and, in the course of a day or two, the whole sweep of ice, which probably has extended for several hundred miles almost intact, rushes down and out to sea. If it should pile up on the bars or meet with other obstacles at the mouths of the rivers, a flood is the result and all the people living near the mouths (where the posts are situated) are forced to retreat to platforms previously prepared in the woods or take to the second story of their dwellings—if they possess one. Long piles of ice are also deposited on the banks of the rivers and, as these are pretty well covered with mud and gravel, it is only before the best efforts of the July sun that they disappear. The havoc wrought in the beds and banks of the rivers is enormous; huge caverns are gouged out of the banks and hundreds of trees are carried away; the river bottom becomes a series of deep holes and shallow bars.

The shore ice is said to linger about, dashed back and forth on the shores, till the middle of June. James bay freezes for a few miles out and this ice after it is loosened up, is detained for a good while by the action of the tides and by the prevailing winds. As, however, the tide flows south (comes in) for only five hours while it flows north (ebbs) for seven, the shore ice gradually works off to the north and finally loses itself in the wide expanse of Hudson bay. This does not occur until the end of July and ice is said to hang around Cape Henrietta Maria even longer than that; this last summer huge fields of shore ice were visible off Neakwow point on July 24. The small coasting steamers of the Hudson Bay Co. and Revillon Frères never enter any of the rivers on which their posts are situated much before July, though it would probably be neither very difficult or very dangerous for them to do so by June 15.

Frost is apt to occur almost at any time. On June 15, when camped on the Kenogami a few miles above its junction with the Albany, we experienced a severe frost—severe enough to form ice of considerable thickness on the water in the camp utensils. I am inclined to think that frosts occur late in the season more frequently inland than on the sea coast as we had no noticeable ones in this latter locality until the first week in August. On August 3, we had a heavy frost while at a little stream a few miles north of Opinegau river. This was the most noticeable one of the entire month for although there were others, they were not severe. During September, too, there was scarcely any frost while we remained on the coast. When we began our journey up the Moose river, we had not been out many days before we experienced low temperatures at night. When one considers the distance north, the coast makes a very creditable showing in this regard; it is by no means unusual for frosts to occur in the early part of August in the country between Sudbury and Porcupine, hundreds of miles to the south—a country demonstrated to be suitable for agriculture.

Whenever the wind blows from the north, cold weather results instantaneously; this is due to the above-mentioned fact of the presence of the shore ice to the north. The bay is not notorious for winds or for bad weather conditions. If the past summer be an average one, it will compare favourably with any large body of water in existence. There were only one or two winds during the whole four months spent there which would make dangerous weather for steamers; there were perhaps a dozen storms which would have made it rather hazardous for small sailing schooners or fishing smacks. Compared with a large inland sheet of water—lake Nipigon—on which the writer spent the previous summer, James bay stands out as safe and dependable for navigation. This year south winds were very prevalent and almost without exception, they were very hot. It is not known whether this is invariably the case. During the first two weeks of August there were about nine days on which

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south winds blew. Without exception they were light and balmy. During the middle weeks of September there was an eight days' gale of violent south winds. This was the longest blow from any one direction without intervening change within the memory of any of the white sailors.

Rainstorms were infrequent and there was not very much thunder. There were numerous days on which a little rain fell. There was a very large proportion of days on which the sun shone. The finest weather of the season was in September; the first three weeks of that month would compare favourably with the average weather of the same month anywhere in Canada. There was no sign of snow up to the date when the party left the bay (September 25). The temperature would of course average less than during any corresponding period of time in southern Canada, but there were plenty of days on which the sun made it uncomfortably warm. The hours of sunshine in that high latitude are unusually long; at Albany, it was possible to read in June by the twilight at 10 p.m. On July 8, at Lowashy river we had 16½ hours of sunlight and on August 3, at Nagedowzaky river (Lat. 54.30) we had 16 hours of sunlight.

A continued blow from the north brings rain, sooner or later; the wind then usually changes to the south and after a heavy blow from this quarter, fine weather comes again. Fogs were practically non-existent, though the Indians informed me that they occur more frequently, late in the fall. Owing to that and to other climatic conditions the coasting steamers and schooners usually try to get done their work by the end of September. This past summer, the Hudson Bay steamer *Innu* was delayed in her work, and by September 25, had still several cargoes to take out from the depot on Charlton island to the various posts around the bay. She was considered by other men accustomed to the bay to be in rather an unfortunate condition, though every one was willing to concede that she could perform her trips without a great deal of danger.

By October 20, heavy frost and low temperature has become almost constant. By the end of the third week of that month the rivers are in a freezing condition and the more northern ones are frozen. By the end of the first week of November the Albany has frozen and winter has set in. From that date on until the end of April, winter is continuous; there are no thaws and no soft weather. The thermometer does not register any lower minimums than many places in Ontario and the West but the low temperatures are continuous, and for days at a time the thermometer will stand at thirty or forty or even forty-five below zero. Travelling is then performed by means of dogs, the broad band of ice along the coast making excellent going. This ice is quite smooth and glare with no snow upon it, that being all turned into ice by the tide rising over it. The country is beyond the line of greatest snowfall and the snow is not extraordinarily deep at any time. In fall, the freeze-up comes before much snow has fallen and in spring the snow has gone from the clearings before the rivers melt. For every 75 miles north, the difference in season is about five days.

Altogether it may be said that while James bay has a long and severe winter, it also has a summer equally unbroken and of very fair length. All the year is divided between winter and summer—the between-season is very short. During the summer, conditions there are not different from conditions elsewhere in the country and there is no obstacle that would hinder the carrying on of all the activities customarily associated with summer.

WEATHER RECORDS FOR POINTS ON JAMES BAY.

Opinegau river (Lat. 54.15).

River open.	River frozen.
1914, May 5.	
Average, May 28.....	Oct. 25

Attawapiskat river.

1912.....	Oct. 26
1913, May 21.....	Oct. 28
1914, May 12.	

Albany river.

(Compiled chiefly from the Journals of the Anglican Mission).

WEATHER RECORDS FOR THE ALBANY RIVER.

Year.	River Open.	Events of Interest.	River Frozen.	Events, etc.
1883			Nov. 11..	
1884	May 17..	First spring goose, May 1.....	" 2..	
1885	" 15..	April 26, first goose.....		
1887	" 18..	Bad flood.....	Oct. 30..	
1888	" 12..	Small flood. April 21, first goose..		November 18, 5 degrees F. November 25, 20° F.
1889	" 6..	April 12, first goose.....	Nov. 5..	October 2, potatoes raised.
1890	" 28..	May 3, 15° F.....	" 5..	
1891	" 14..	April 15, first geese.....	" 15..	
1892	" 21..		" 6..	
1893	" 14..			December 3, 30° F.
1894	Apr. 30..	Bad flood.....		
1895	May 5..		Oct. 27..	
1896	" 10..	April 15, first geese.....	Nov. 15..	
1897	" 7..	April 12, first geese.....	" 10..	
1898	Apr. 27..	April 14, first geese.....	" 23..	
1899	" 29..		" 12..	
1900	May 2..	April 6, first goose.....	" 13..	November 6, first snow to stay.
1901	" 1..		" 7..	October 11-20, 50 bags of potatoes raised
1902	" 15..	April 22, largest snowstorm of the year.	" 11..	
1903	" 20..		" 13..	
1904	" 8..	May 15, North Albany still frozen.		
1905			Oct. 23..	Exceptionally early fall.
1906	May 4..		Nov. 11..	
1907	" 26..	June 1, North Albany breaks up..	Oct. 22..	
1908			Nov. 17..	
1909	May 21..	April 27, snow going.....	" 17..	
1910	Apr. 22..	May 2, 21° of frost.....	" 8..	October 1, potatoes raised.
1911	May 3..	Apr. 27, river began to break...	Oct. 31..	
1912	" 14..		Nov. 17..	October 30, heavy frosts.
1913	Apr. 28..		" 5..	October 30, 0° F. at night.
1914	May 6..	May 7, bad flood.....		
1898 Apr. 27, Earliest.....			Oct. 22, 1907.	
1890 May 28, Latest.....			Nov. 23, 1898.	

NOTE.—The coming of the first goose indicates about the same facts as does the first appearance of the robin further south.

By the end of April as a general rule, the river banks are cleared of snow, and by the middle of May all snow is gone except that in the depths of the woods.

ROUTES.

Undoubtedly the best way to get to and from the bay outside of the sea route is by means of the Albany river. The traveller may take advantage of the National Trans-continental westward from Cochrane. After he has made a run of 175 miles, he will get off at the crossing of the Nagogami river. From this point a portage of a mile and a half leads around the rapids that occur just at the railway. The Nagogami is very rapid for the first few miles of its route but all the portages are passed in the first 15 miles. Exclusive of the first there are only three, each of which is very short. All other rapids are run when the water is high and the canoe is waded down them when it is low. Once past these places, the traveller has clear sailing until he reaches the bay; there are no more rapids in the Nagogami and none in the Kenogami; this latter is a very large river with plenty of water in it and having a very rapid current. The flow of the Albany is just as swift and its water deeper. In size it is fully as large as the Ottawa. About one week will suffice to make the 300-mile trip down stream and about fifteen days will be occupied in the return journey.

FOOD SUPPLIES, ETC.

Both the Hudson Bay Company and Revillon Frères maintain numerous posts on the bay at which can be obtained all the staple articles and at the larger posts a good many luxuries as well. Considering the number of times these goods must be transhipped and the risks of the trade, prices are very reasonable; at one place, indeed, I found them just as low as at Cochrane. The personal equation, of course, always is a big factor in such matters. Plenty of fresh meat may be obtained along the coast. Ducks and other smaller wild fowl are present in incredible quantities and are not hard to obtain. Caribou meat may sometimes be purchased from the Indians. The moose has not yet penetrated north of Albany. The greatest obstacle one has to contend against in the matter of food is provided by the "husky" dogs. These brutes are everywhere and have an appetite that is surpassed nowhere on earth; the only means of securing anything from them, be it food, boots or camp supplies is to raise it all up on platforms well out of their reach.

COASTING.

The aboriginal mode of travelling along the coast is by canoe; the fur companies however make use of small schooners of from 30 to 40 feet of keel. Both these methods give rise to extremely vexatious delays, occasioned for the most part owing to the tide. In using a canoe, it is next to impossible to get an Indian to venture out on the water when there is a bit of a head wind and he positively refuses to travel when the tide is out. Coasting resolves itself into paddling for about three or four hours every day from half tide through the full tide to half tide again. There is justification for this process when the tide is high, say at noon and again during the middle of the night. In this case, if one were not to land on the grass-plain at the edge of the high tide mark, when the tide began to retreat, he would have to keep on following the water out until he was almost out of sight of land and then continue paddling all night until the tide came again; or he would have to sleep in his canoe when evening came as it would be next thing to impossible to transport the camp outfit over the miles of mud that would intervene between him and dry land. When the course is from river to river, however, there is no need to lay up when the tide is out as all the rivers except those in the north can be entered by a canoe at low water; it is merely a case of going far enough out to pass the sand and mud that the river has piled up for miles from its mouth. This the native usually is afraid to do. Sail-boats nowhere on the west coast can beat against the tide except they have a beam or fair wind. They thus have to anchor when the tide turns on them. As most of the posts are situated well

up the rivers—inside the tree line as a usual thing—it is often a matter of two or three days before even the river can be cleared. These little boats are used constantly to make the run out to Stratton or Charlton island, which entails a journey of 50 or 60 miles from one point of land to another. Open boats are also used for coasting work, but numerous wrecks occur among these, especially on the badly exposed shore north of Agumiski island; no one, however, has ever been known to be drowned in these mishaps.

FUEL.

One must depend largely on driftwood for his firewood; if that is lacking, he must break dead boughs off the scrub willows that grow within a mile or two of the sea; these are usually damp and very small; the fire they make is sufficient to boil tea, but will do little else. At all the larger rivers, of course, the canoe may be run up to the tree-line where plenty of wood is obtainable.

NATIVE HELP.

If at any time commercial fishing should be undertaken, people would possibly look to Indians as the source of the labour required. That source at the present day is abundant and contrary to the general opinion not decreasing, but it is not of high quality. Nature never intended the Indian to be a hum-drum working man and civilization cannot make him so. He will accept work but the monetary features of it have very little attraction for him and he does not hesitate to quit and do nothing if he is not pleased with it. The fur companies have developed a sort of patriarchial arrangement whereby they keep the Indian employed at nominal tasks all summer in order to induce him to give his employers his fur in the winter. He has thus never been schooled to real work outside of the hardships he experiences in his own method of life. His dependence on the Government has made him lose whatever ambition he ever possessed and he is now utterly improvident. Some things he does well, as work that involves the use of tools, but the most of the peculiarly white man's tasks he does very ill. He fishes, and fishes very successfully after his own fashion, but is too conservative to change for a better one. His extreme dislike for the terrors of the sea would make it hard to make a deep-sea fisherman out of him. Yet, here and there are individuals to be found who are thoroughly reliable and courageous men. More than that, the Indian has been employed in certain places and although he is not as satisfactory as white labour, he has filled the gap when no one else was obtainable. The fur companies pay even their bonded servants a very small wage but it is impossible for a stranger to get a guide or helper for much less than \$2 a day and board. Most of the Indians do not return to the posts until June and they begin to leave for their winter hunting grounds towards the end of August. Those who have not far to go, may stay as late as the end of September. Although they do not excel at steady labour they are unbeaten as guides and never fail to pilot the white man through to this destination safely if they are allowed to take their own time and go about it in their own way.

NETS AND CONDITIONS OF FISHING.

All the rivers of the west coast are, owing to the absence of dams in the shape of high ridges of rock (which form rapids and falls on other systems) very swift and with few quiet backwaters, deep pools or calm reaches. It is thus difficult to set nets in them. What usually happens when this is attempted is that the net is dragged from its natural position at right angles to the shore and cast up on the beach further down or even torn completely away and lost. To add to the fisherman's difficulties, these streams are for the most part very dirty and carry along with them large quantities of sticks, stumps and other debris. In the upper reaches of the Albany so hopeless a proposition is it that the Indians do not depend greatly on fish at all though

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without doubt at certain periods of the year they are present in plenty. Probably such a state of affairs could be solved by using drift nets. The same remarks apply to the tidal waters; the tide is equally as difficult to reckon with as is the river current. Nets set off the coast of Agumiski were filled with sea-weed and dragged along by the tidal currents as if they were not anchored at all. In such cases, too, the remedy would be drift nets. The Indians have adopted the following plan to enable them to set their nets in water where the tide runs strong; they select the bank of a river and, beginning on land which is uncovered at low tide, they plant a row of strong stakes at right angles to the tide. This row they continue out as far as it is practicable to drive them into the bottom; they seldom reach thus a depth of more than 7 feet. On the side of the stakes against which the strongest current comes—that is, river current or tidal current—they place their net which is thus held in position by the stakes. That portion of the net placed on the tide mark is covered by the incoming tide. The same method is also employed on the coast, stakes being placed at right angles to the shore. As no west-side Cree ever yet attempted to fish in water that was not in immediate proximity to the shore, the problem of how to meet the tidal currents of the deep water has not yet been solved. So, too, but little use of the stake-plan is made in the upper waters of the Albany because the river gets deep too quickly from the shore to permit of the stakes being securely fastened.

Most of the other rivers afford more or less room for nets. Thus in the Kapiskau there is a place about 7 miles from the mouth where the river makes a sharp turn and has gradually cut off an elbow in making that turn. That particular place is splendid for putting nets down and also, incidentally for getting them filled with the best of fish. In the estuaries of all the rivers there are abundant backwaters in which it is easy to set nets. That statement is especially true of the Attawapiskat which by reason of its large number of mouths has numerous islands and back channels in which the water is still. It is impossible to seine without the greatest of difficulty in the whole stretch of the Kenogami and Albany until one gets among the islands near the mouth of the latter; the banks are too steep and the current is too strong. Nets should at all times be very securely anchored as the wind and current have great power in washing them away, especially when there is added the force of an ebbing tide. Two nets were lost during the summer owing to the wind and tide carrying them out to sea. The backing of the nets should also be well seen to, not only because of the strength of the current but because of the frequency with which white-whales and seals come into contact with them; if the backing be secure they will merely go right through the nets; if it be weak, it will break and the whole net will be carried away.

Repeated observations show that nets of the type that the Indians use are best suited to the work. These nets are narrow—about 20 meshes wide—and quite short, never more than 15 fathoms in length. Nets of the enormous length of those used in the Great Lakes would be quite out of the question. The mesh too, must be small—from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches is the best size. I will quote a few figures to show the greater utility of the small meshed-net. Out of three short nets set parallel to each other a short distance apart, 40 fish were obtained. The middle net was about $3\frac{1}{2}$ -inch mesh and considerably longer than the other two. The other two were the regular Indian size—about 2 inches. Out of the large meshed net came 4 fish, all the others were taken in the small-meshed nets. One of the small nets was raised and in another hour out of the other one were taken half a dozen whitefish, out of the large meshed net, none at all. And the small nets took the largest fish that we were in the habit of obtaining just as readily as did the large meshed nets. Again, on one occasion out of a total of 18 pounds of fish from five short nets, two of which were small meshed, all but one or two individuals were in these two small-meshed nets. It is abundantly apparent that nets with a small mesh are the most suitable for the fish of the west side of James bay.

HARBOURS.

Outside of the rivers, there are no harbours. Of the rivers only one—the Albany—will admit vessels drawing up to 8 feet; the Kapiskau, it is said, will admit a craft drawing about $7\frac{1}{2}$; the Attawapiskat takes a sail boat of $4\frac{1}{2}$ and the Ekwan and Lowashy are even shallower. All these depths are at high tide and the 8-foot craft that comes into the Albany must come in on a more than average high tide. The depth of water on the bars of these rivers at low water is about 3 feet or less. The Albany outer bar is just about out of sight of land—10 or 12 miles away at the least. A ship approaching the mouth of that river is forced to drop anchor in the open sea and lie there in no matter what kind of weather until the tide becomes high enough to allow it to cross the bar. One feature in the navigation of the west coast is that the slope of the bottom is so regular and so gradual that mariners by sounding can tell at any moment just how far off the coast they are.

THE ALBANY.

The Albany enters the sea by three mouths—the North and South rivers and Chickeney creek. Between the South or so-called main river and the North lies Albany island, about three or four miles in breadth. Between the North and Chickeney, there is a stretch of 12 or 15 miles. The South river is the river on which all the posts are located and the one that has been used for generations. From the “rapids” three miles above the settlement, which are the head of tide water, to the outer bar, is about 15 miles; an arc of a circle with the north and south shores of the river and the bar as points upon it, would have a length of 10 miles; within that arc the water is fresh at all times. The channel in front of the settlement is about a mile wide and three or four fathoms deep in places.

A good channel for ships of almost any depth is obtained once the half-mile long outer and inner bars are crossed. The estuary contains numerous small islands, shoals, bays and backwaters in all of which, at the times of the year indicated above, fish abound; there are, too, also several small rivers and creeks which enter the main stream at this point, in which the number of fish caught is prodigious. The North river is even deeper though not quite so wide; its current is much swifter and it perhaps carries the greater volume of water. It does not afford as much scope for the setting of nets as does the south river, although islands and backwaters are numerous. If properly investigated it would probably be found to have the best ship channel of the two. Altogether, in the estuary of the Albany, there are probably 30 or 40 square miles of good fishing grounds.

The next river to the north is the Kapiskau. All the sailing craft on the west coast enter it and it was this year proposed to send the steamer *Inninu* there. Once over the bar, there is plenty of water for a small steamer of say a couple of hundred tons. The bar is situated far out to sea and is probably travelling farther away from land all the time. This river has piled the mud up on either side of its narrow channel for miles beyond the grass limit; on this account it gets its name, which means “Shut-up river.” The tide extends for a dozen miles above the grass and nowhere does it flow with greater velocity than at this river.

The Attawapiskat river, the second largest on the coast, flows into the sea by five mouths, of which the Lowashy river is the most southern.

Lowashy divides from the main channel 40 miles above its mouth and enters the sea 10 miles to the south of it. At its mouth the shoals are extraordinarily wide. When the tide is out the sea literally cannot be seen from the shore, impassable stretches of mud and boulders intervening between. The river has a very shallow channel at low tide but a small fishing smack could get in at high water or even half tide.

The Attawapiskat's delta is about five miles across not including the portion between Lowashy and the next mouth north. The only branches of importance are

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the Boat river and the Main river. Boat river is no longer used by the schooners on account of its narrowness, but it is said to have a better channel than has the Main river. The other two branches both leave the Main river within a few miles of the post. Boats have fair anchorage opposite the settlement though the river is filling in on the north side so quickly that it is making the main channel narrower all the time and thus more difficult for a sailboat to ascend from the sea—a distance of 9 miles. The channel out from the grass banks is usually indicated by beacons of latticework erected on poles. These extend for 3 or 4 miles out from the grass and when they are left behind the only safe course for the sailor is to head straight out till all danger of grounding has, as revealed by the lead, passed.

The Ekwan is the last river on the coast into which boats may go. It enters by two main mouths but soon after one leaves the sea it becomes very shallow. Numerous shoals mark the approaches to it and it would be impossible to lie behind these in case it was impossible to get into the river. The Manowinan islands also, a few miles off shore and to the south would give shelter from some winds.

If a boat enters the Opinegau river, it must be prepared to lie high and dry on boulders and mud when the tide goes out and even at that it can barely get into the mouth of this little river.

POSSIBILITY OF OYSTER CULTURE.

I take the following extract from the work of Dr. Jos. Stafford on the *Canadian Oyster* in the report of the Commission of Conservation for 1912:—"The physical conditions of natural-oyster producing, as compared with non-oyster producing, areas will determine the prime essentials, not only for the life of the oyster, but for the successful production of eggs, larvae and spat. Along our coasts the oyster lives and breeds in comparatively shallow bays, coves and estuaries of rivers that are sheltered from the deep, cold, stormy waters of the gulf and ocean by islands or projecting, long sand-bars; that have areas of less than three fathoms depth, a tidal fluctuation of only three to five feet, and some admixture of river water; with rather hard bottom of rocks, stones, clay or sand, often overlaid with a dark-coloured, light, loose, fluffy ooze of organic origin, but no deep heavy, sticky mud or shifting sand. The salinity generally lies between 1.012 and 1.020 (distilled water being 1.000) but varies a few degrees with the ebb and flow of the tide and with the amount of river water. In the early part of July the temperature approximates to 20 degrees Cent. (68 deg. Fahr.) and, owing to the small exchange of tidal water and the great amount of heated sand, there is no great and sudden variation. Such physical conditions are also favorable to the presence and multiplication of numerous diatoms and other minute food-supplying organisms.....

"A river. may discharge over or in proximity to oyster beds.

"Lime is required by the oyster for the construction of its shell which forms the greater part of the weight of the oyster. The amount of this existing in. . . oyster shells is enormous, all of which, or the constituents of which, must be contained in the water. It comes from the disintegration of old shells, from rocks in the ocean and along the shores, but especially from the river water that has drained through the land and over the rocks of river basins.

"The temperature of the water where oysters abound, varies with the year, the month, the physiography of the contiguous land, prevailing winds, the size, shape and depth of the body of water, the nature of its entrance, the presence of islands, reefs, sand bars, shoals, flats, the extent of the shore, the amount of river-water, evaporation, sunshine, fog and such-like conditions. The oyster itself can withstand considerable changes of temperature—it is the developing young which suffer. Accordingly there

has risen a periodicity in the spawning, which falls in the warmest parts of the season. As soon as the snow and ice have disappeared and the spring freshets subsided, the water gradually rises in temperature and becomes inhabited by increasing numbers of microscopic plants and animals. In May and June, oysters like other large animals that live on such minute plankton organisms, begin to ripen their eggs and spawn in time to give their offspring the advantage of the long spell of comparatively calm and warm water." Dr. Stafford then notes that on July 7, 1909, at Shediac, the water was at $63\frac{1}{2}^{\circ}$ F. and the warmest water he records is $72\frac{1}{2}^{\circ}$ F. on August 2.

When applied to James bay, these facts mean that the only possible places for oyster culture would be in the river estuaries. In these locations, the tidal rise, the depth, the salinity of the water, the supply of lime would all be most satisfactory; the factors likely to prove unfavourable would be the temperature and the nature of the bottom. There is no doubt but that spots could be found where the bottom was hard and where the mud would not be soft enough to allow the oyster to sink in it and thus be suffocated. There might be danger from shifting sand but if sheltered places were chosen, this would be very immanent. The temperature is at the south end of the bay high enough but it is probable that the season is too short; by the end of June the water has almost reached its maximum temperature but this begins to fall rapidly about the middle of August. The natural northern limit of oysters is supposed to be around the St. Lawrence but, so far as is known, no really serious effort to acclimatize them further north, has ever been attempted.

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AGRICULTURAL POSSIBILITIES.

It is important to note that there are very good prospects of some of the region near James bay becoming fit for agriculture when drainage and deforestation have taken place. The fact that garden produce can already be grown is most satisfactory in view of the influence this would have in inducing fishermen to take up their residence in the country. I believe it would be quite possible for a man to live comfortably from the products he had himself raised. The soil is exactly the same as all through the much-talked of Ontario 'clay-belt' and the climate is, though rigorous in winter, one of long sunshine in the summer. Already at Moose Factory, everything in the way of roots has been grown, oats have been raised regularly for years and even wheat was ripened last year. At Albany potatoes are a good annual crop while such things as lettuce, radishes and turnips also do well. At Attawapiskat, so far attempts to ripen potatoes have not been a success, but I have reason to think that a fair trial has not been made. The country is one of the finest imaginable for cattle as untold quantities of hay grow along the coast—which already sustain a few head at each of the posts. All the different kinds of domestic animals have at one time or another been brought to the bay and all without exception have done well. It is quite possible that the future will see this country a well settled farming community.

CONCLUSION.

In conclusion it is only necessary to draw attention to one or two of the most salient features of the conditions relating to fish in James bay. By far the most valuable fish is the whitefish; this fish has been taken in great quantities for very many years and so far as information can be obtained shows no signs of decreasing; nature has provided that few of the spawning fish should be destroyed and man has confined his operations to fish which are not ready to reproduce. In view then of the peculiar situation existing, it hardly seems necessary to enact the usual rigid close-season laws in this case. The speckled trout will no doubt in time provide good sport

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for the angler and the tourist; at present of course, the entire lack of communication or transportation facilities prevents—except by people actually resident in the country—any use being made of any of the fisheries. When the Hudson Bay railroad is opened, it will be possible to get the products of the smaller bay out to the cities of the west in the course of a few days and then we shall expect to see greater use made of them. Such a traffic will require substantial fishing tugs, quite independent of wind and tide, for these latter are the great bugbear of all traffic carried on with the old-fashioned craft. If a line should ever be built from Ontario to the bay, the Ontario north will be supplied in the same way. The great rivers of the west coast of Hudson bay are as yet unknown quantities. Winisk, Severn, the huge Nelson, the Churchill and all those of the Chesterfield inlet, remain to be investigated; when these have added their stores of wealth to the sum already obtained it will be found that in the great seas of the north we have a food-resource of the first magnitude. It is not too much to predict that some time in the future the supply of fish that comes from the salt water of the north will be as constant and as plentiful as that which at the present is yielded by our great inland lakes.

ALBANY ESTUARY

THIS DIAGRAM SHOWS CORRECTLY THE POSITIONS OF THE OBJECTS NAMED, TO ONE ANOTHER, BUT IS NOT NECESSARILY CORRECT IN GENERAL OUTLINE



HUDSON BAY

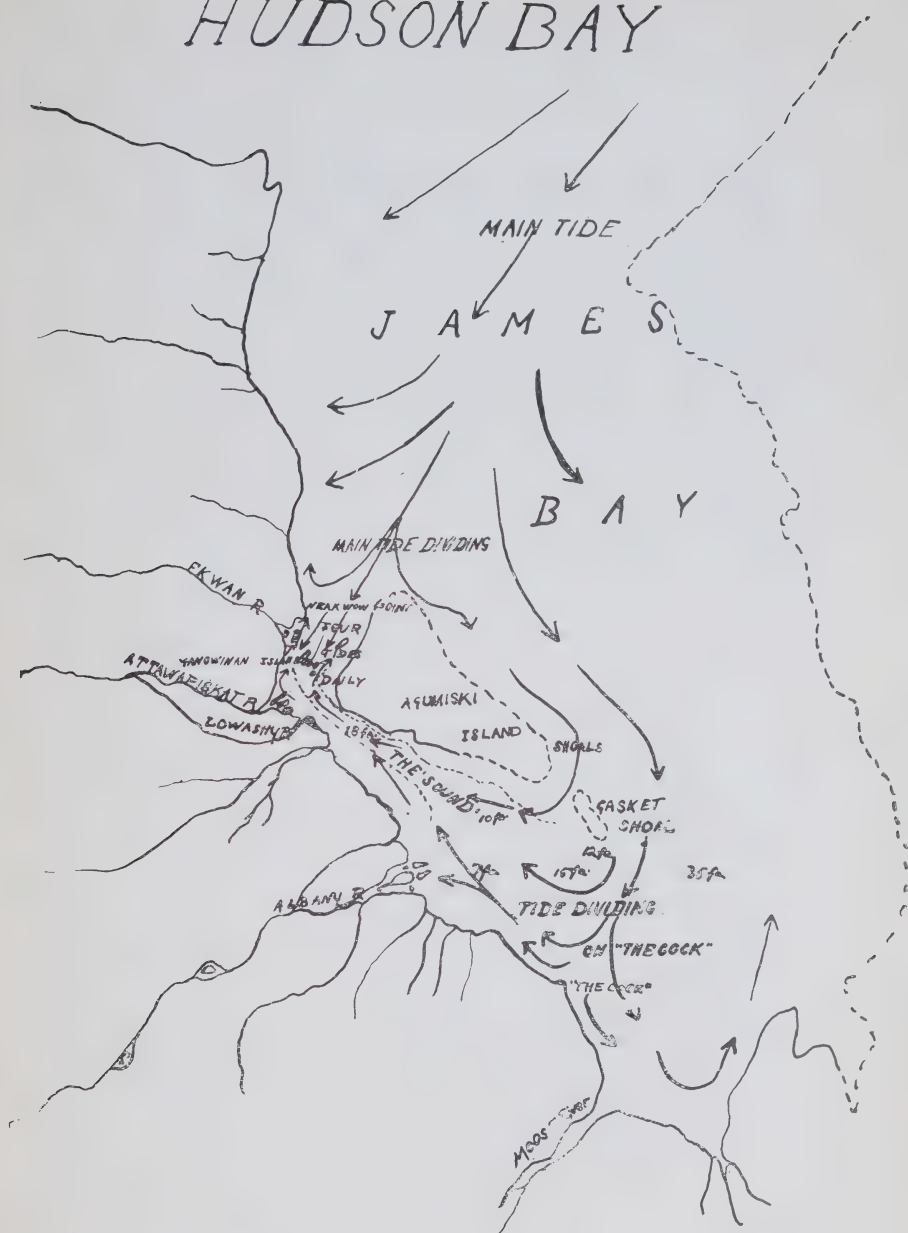
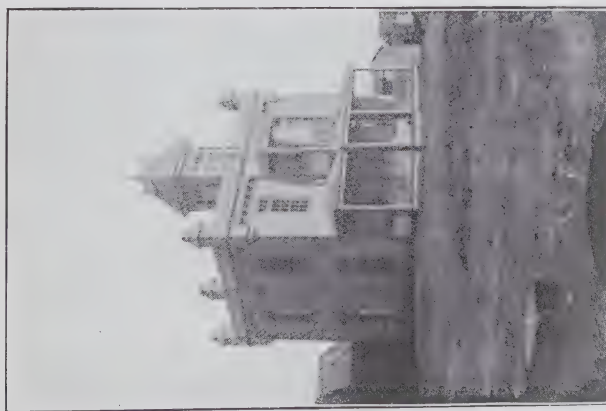


DIAGRAM TO ACCOMPANY

DESCRIPTION OF TIDES



Father Boisseau's residence at Atawapiskat Post.



Speckled Trout from the Opinegan.



Spring Ice on the Albany, June 22.



Fish caught at Lowashy River, July 8. The largest one is a Speckled Trout.



Appearance of the Coast at Low Tide—Two miles from Land.



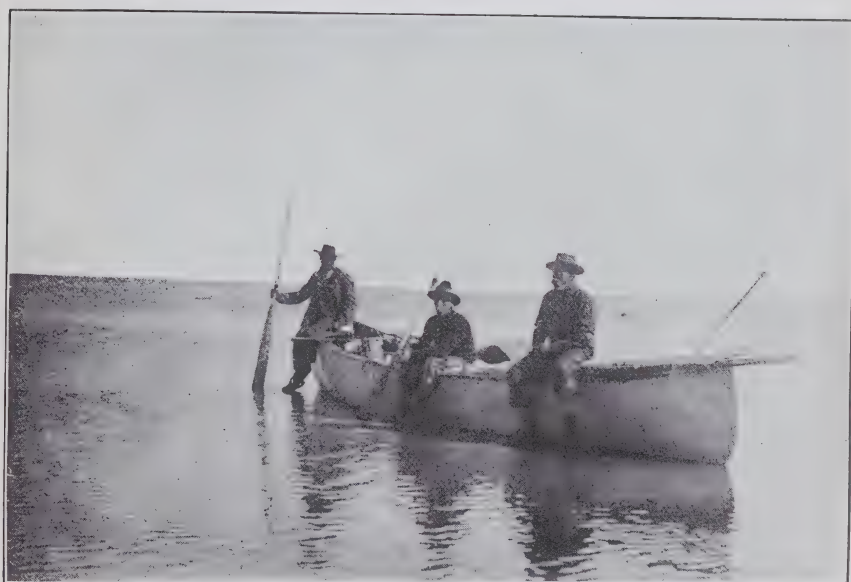
A Cree Encampment.



Preparing the Nets to set--Kapiskan River.



Fish caught at The Kapiskan in August.



"Farthest North"—Tide entering Mouth of Nagedowzaky River, August 4.

REPORT ON THE FISHERIES EXPEDITION TO
HUDSON BAY IN THE AUXILIARY
SCHOONER "BURLEIGH"

1914

BY

NAP. A. COMEAU

Godbout, December 7, 1914.

The Deputy Minister of the Naval Service,
Ottawa.

SIR,—I have the honour to enclose herewith my report on the *Burleigh* Expedition to Hudson Bay. As will be seen by it, the season was an abnormally late one, which left me a very short time for work there. I regret this very much as I am sure that the southeastern shore would have proved to be of greater value in fisheries than the western portion, though the latter is very promising. It would take one full season to investigate these properly and I trust the department will continue this interesting work.

I have the honour to be, sir,

Your obedient servant,

NAP. A. COMEAU,
Officer in charge of "Burleigh" Expedition.

REPORT OF TRIP TO HUDSON BAY—BURLEIGH EXPEDITION,

N. A. COMEAU, OFFICER IN CHARGE.

As per instructions received, I left Godbout on the 22nd of June, for Halifax, there to join the schooner *Burleigh* and proceed to Hudson Bay, as soon as possible thereafter.

Arrived at Halifax on the 26th June, and next day went to the Department of Marine and Fisheries agency and reported. I found that the vessel was far from ready. However, work was proceeding as quickly as practicable. Supplies were ordered, crew engaged by the captain, sails bent on, etc., and we were finally ready to sail on the 8th of July. In the end this delay did not make much difference, as we could not have entered Hudson strait before the date we arrived there, July 31. The ss. *Bonaventure* which left Halifax about July 3 arrived off the Button islands on the 14th and was 17 days in the ice, before she could force an entrance on the same day that we reached there. I had expected this all along, owing to the late season all over the rest of the province; so it could not differ much so far north, in fact we might expect worse. The weather was very cold, from the time we passed Belle Isle till we reached Port Nelson, the thermometer was only a couple of times above 40° Fahrenheit, and as low as 25°. (See table of temperature for the trip.) During the passage of 37 days, we had 25 of more or less fog and rain. We had intended going to Fort Churchill in the first place, but owing to some trouble with our compass, bringing us further south than expected, we headed for Port Nelson, so that I could report our arrival to the department. We reached there on the 14th of August. Next day prepared our camp outfit and provisions, and left on Monday the 17th to investigate the fishing on the Nelson river. This work was later continued along the coast line and in other rivers until the 24th of September. As the *Burleigh* could not be kept there so late, I had ordered her back on the 8th of the month, thus giving me two weeks more time there for my work. I returned on the *Bonaventure*, leaving Port Nelson on the 27th September and arrived at Sydney on the 6th of October, p.m., and the *Burleigh* reached Halifax on the 19th of October. In this report each subject will be treated under separate headings.

WHALES.

Many whales were seen on the trip, both going and returning between the straits of Belle Isle and Hudson strait. All in that section were apparently of the kind known as "finners" *Balaenoptera sibbaldii*. In Hudson bay I only saw one, a "bow head" *Balaena mysticetus*, it was seen about one hundred miles from Cape Tatnam. The beluga or white whale was seen in great abundance in the estuaries of the Nelson and Hayes rivers and also in those of all the rivers and creeks of any size in that vicinity. In the Nelson I saw them up near Seal Island just a mile or so below the tide limit. In the smaller rivers and creeks they only enter the mouth at high water and move out as soon as the tide begins to fall. From examination of the contents of four specimens, (one shot at Partridge river), I found that their chief food consists of whitefish and capelin; in one there seemed to be remains which looked like that of a carp or sucker.

They enter the streams shortly after the ice is gone out, and when the fish are on their way to sea, disappear for a short while, and then return with the migrating fish on their way back to spawn. The quantity of fish consumed by the beluga must

5 GEORGE V., A. 1915

be enormous. When the locality can be more easily reached, and labour and cost of living cheaper, I believe they can be taken in paying quantities, by the use of stake fisheries as used in the St. Lawrence. The water being discoloured with clayed substances would be a great advantage. I noticed they were much less shy than in the St. Lawrence. Their destruction should be encouraged.

SEALS.

At certain periods, notably in September, when the fish enter the rivers, seals follow them up. In the western portion of the bay, visited, they all appear to be of one species, which I take to be the "barbed seal" *Erignatus barbatus*. I shot three of them, but unfortunately secured only one, which floated some days later and was partly eaten by bears. I have, however, secured the best part of the skull which will be sent to the Department. In the straits I observed some harps or Greenland seals, *Phoca groenlandica*, fleo rats, *P. hecida* *P. vitulina* and one hood seal, *Cystophora cristata*. Around the McDonald islands and Charles island they were especially numerous. I had no chance of securing any. Four narwhals, *Monodon monoceros*, were also seen in that vicinity. No walrus were seen at all. The stomach of the seal killed contained remains of suckers and whitefish, but I presume that all kinds of fish found there fall a prey of them. The destruction of fish by the seals in that western section from Churchill to James bay, cannot be very considerable, because they are not numerous anywhere in the vicinity and at times are not seen at all. Very few are killed, the Indians not appearing to care much for them either for food or otherwise, quite in contrast with the Esquimaux, who pursue them constantly, further north.

SALMON.

No appearance of any kind of salmon was seen in any of the several rivers that I visited, although I tried many times with drift and fixed nets and also the seine. The locality is certainly not very favourable for that kind of fish, owing to the clayey bottoms of all these streams and the extensive mud flats in their entrances. Many of these rivers cannot be entered even by small fish before the tide is more or less high. The whole of this western coast line is very low, swampy ground; near the sea coast there is a grassy beach two or three feet above the summer river level. The streams cut their way through these low banks for a short distance from the mouth and then the water spreads itself out like a fan over the extensive flats and loses all semblance of a river. One can often be only half a mile from the entrance and find no indication of any river, unless it is a good sized one.

Further north beyond Churchill and in the south eastern portion of the bay where the rivers have sandy and gravelly bottoms, the natives tell me they have taken a species of fish, which, according to the description, belongs to the salmon kind.

I have a report that one salmon was found dead on the ice, in Stupart's bay on the 5th of August, by one of the crew of the s.s. *Bonaventure*. From the description given to me, it was apparently a specimen of our Atlantic salmon *Salmo Salar*.

TROUT.

From reports gathered from residents, Hudson Bay Company's agent, and natives, trout migrate to the sea immediately after the opening of the rivers in spring. This usually takes place in that section early in June in ordinary years. The fish return about the middle to end of July, and probably in August. Sergeant Walker, an ex-member of the R.N.W.M. Police, showed me a diary that he kept of his catches of trout, on Sam creek where he resides, and the heaviest runs appear to be about the end of June, this was with a net, but he also had some good scores by angling. When I arrived at Port Nelson the run of the fish was considered to be over and no one fished for them, either

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with net or fly. I was told that I was too late for the fishing. However when I went up the river a few miles, I found there were still plenty to be had, both 'by net and angling. In the main stream of the Nelson I could not get any by angling either with bait or fly, but I got plenty in the net. In the small tributaries and creeks wherever the water was bright and clear they took the fly readily. They ranged in size from half a pound to five and a half pounds, this last being the heaviest fish I caught on the fly. This fish was taken at the entrance of North Seal creek, a tributary of the Nelson. The probable cause of their not frequenting the main river is due I believe to the discoloration of the water by clay and the immense quantity of sediment in suspension, especially after rain, which washes down its steep clayey banks. The residents claim there are two kinds of trout. One they call salmon trout and the other river trout, basing their distinction on the colour of the skin and also of the flesh, one being brightly coloured with red spots and the other of a darker appearance and the spots more obscure. I examined carefully many of those we got and could find no difference at all in them. They are all of the same species, *Salvelinus fontinalis*. The different colour of the flesh is no distinction. It is due to other causes not satisfactorily explained yet. It is not a sexual difference either. All the trout that migrate to the sea lose the bright colours that one sees on the fish that remain in fresh water. The fish that migrate to the sea lose their colour very quickly in the salt water but take it on again after their return to fresh water—exactly the same thing as takes place with our St. Lawrence fish, and I could see no difference between the two. I did not get or see a single specimen of *Salvelinus oquassa* in that region.

Judging from the size of the spawn in the ovaries, the date of spawning of these fish is about the same as ours, about October. It seems as if in the smaller streams and creeks many of the fish never migrate to the sea, and not having the same abundance of food never attain the same size. These are what the people call the river trout, or with us, brook trout. If, perchance there really is another variety, I did not see any specimens during my trip.

STURGEON.

This species of fish is reported to be abundant in the upper waters of both the Nelson and Hayes rivers. An odd one is sometimes taken in the whitefish nets set by the Indians in the estuaries, but the proper fishing grounds are said to be at and above the Limestone rapids. We tried both fixed and drift nets in the entrance and tideway, but did not succeed in getting any. I also tried in the same way the pools below Deer island without success. I believe the water was rather too deep in that section, in one place I found thirty-eight feet of water. The bottom of the river certainly appears very favourable and well suited to the habits of these fish. In all the eddies and sheltered places long grasses and other water plants are abundant, and must afford good feeding grounds. Dr. Sinclair, of Le Pas, who came down the Nelson in September, told me he had seen one killed by the Indians on the way. It was about four feet long. This was during the present season. Possibly earlier in the season, in June or July, the fish may be found near the estuaries.

WHITEFISH.

This is certainly the most abundant and valuable fish of that region. Early in the spring, after the ice has gone out of the rivers, they are caught in short nets set along the shores at random, in any place, not only in the rivers and estuaries but along the coast line as well. This would indicate a migration to the sea, and possibly they may have been seen or taken some distance off shore, which has given grounds for the report that large herrings had been seen in the bay. To the ordinary observer, they could certainly be easily mistaken for one, as they look very much like herrings. Another good proof that some such migration does really take place is the fact that in September we got them in nets everywhere along the coast that we visited and in the

entrance of all the rivers, big or small, and the run was all one way, *heading up stream*. The settlers, what few there are, and natives, fish for them in the most primitive way. A short net of seldom more than five or six fathoms long, frequently less, and four to five feet in depth, is attached to a few poles driven into the muddy bottom. This net is run out in a straight line from the shore, has no trap or pound of any kind, no floats or sinkers. Very often no canoe or boat is used in setting or visiting the nets, they simply wade out as far as they can go comfortably, it serves as a bath at the same time, not an unnecessary thing. In these short nets an average catch of about fifteen fish is taken each day, just about enough to supply their needs, which is all they care for. This fishing lasts from the opening of the rivers until about the end of July when the fish disappear for a time, and commence running again about the end of August and from that on till the fall. These were the dates given to me by the natives. I found however, by actual experience, that while at the time they were getting no fish at all (August 17) in their shore nets, I could get as much as two barrels in one haul of our small seine. We also set fixed floating nets with a short winger at the end and seldom got less than thirty or forty fish, each day, or night. Later in September the quantity increased considerably, at Seal creek on the Nelson, we got close on to a ton of fish in three hauls of our seine. This seine of ours was only twenty fathoms long and only intended for experimental fishing. Going over so much ground in a few days the places selected for fishing may not have been the best that there is. It takes a considerable time to locate suitable places, having first to ascertain depth of water, kind of bottom, snags, if any, etc. If, as seems to be an accepted fact, these fish move out to sea, the use of drift nets outside, as soon as the ice disappears in July, might prove successful. Of all the fishes of that locality the whitefish will certainly be the one that will prove most valuable and easiest and cheapest to fish.

OTHER SPECIES OF FISH.

There appears to be a considerable quantity of pickerel in the Nelson river, some of very fair size, up to nine pounds weight, taken in our seine. I did not see this fish in any other river, but it will likely be found in the Hayes river also. This fish, although locally called pickerel or jackfish, is really a pike, *Esox lucius*, of our southern waters.

A species of sucker, *Moxostoma*, is also found in the Nelson and Hayes rivers, but it is not much esteemed as a food fish. They do not seem very abundant, as we seldom got more than three or four in a haul of the seine.

Little or nothing seems to have been known so far of the existence of capelin, *Mallotus villosus*, in Hudson bay. I was therefore exceedingly surprised when I found out that the beluga or white whale subsisted partly on them, as proven by examination of contents of the stomach. Dr. Marcellus, at present in charge of the medical department of Port Nelson, but formerly of Port Churchill, states that the beach was some years covered with a small fish, which from his description was capelin. Sergeant Jones of the R. N. W. M. Police also gave me the same information. He said the natives around Fort Churchill collected them for food. This was during the month of June when the fish came near shore to spawn, later on they move out to deeper water and could not be so easily observed. This is what affords subsistence to these immense quantities of white whales that frequent these shores early in the season, before any fish could migrate to the sea from the rivers. One specimen of *goldeye*, weighing two and a half pounds, was taken in a net on the Nelson river, unfortunately the specimen was lost. I had placed it near our tent in some cool moss to preserve it, and it was carried away by a mink during the night. It appeared to be a subspecies of the genus *Coregonus*, and evidently not very numerous, as we did not see it anywhere else on that coast.

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Some of the Indians from York Factory spoke to me of a species of fish resembling cod, which is sometimes seen late in the fall along that shore. Mr. Macdonald, one of the agents of the Hudson's Bay Company, whom I met at Port Nelson, said there was an abundance at times of a species of rock-cod in the south eastern part of the bay. They ranged in weight from two to seven pounds, and were frequently taken in shallow water and some times by fishing from the rocky points. I tried fishing in September, in depths of six to seven fathoms, but got nothing. I don't believe the bottom is suitable for such fish in that section, being too muddy. Mr. Macdonald said he had caught them himself in quantities. The stomach of a polar bear, which I examined, contained, amongst other things, remains of some species of sculpin, shreds of skin, which were mottled grey and black, probably *Cottus Axillaris*. No grayling were seen or taken in any of the streams visited, although they are reported as being common around Churchill and further north.

VALUE OF FISHERIES.

Little or no benefit can be derived for the moment, from the fisheries on the western side of Hudson bay, beyond supplying the local demand. The distance is too great and the difficulties of reaching it too numerous, to enable any sailing vessel from the Maritime Provinces or Quebec making profitable trips, no matter how considerable these fisheries might be. They must be developed by local fishermen and this will only be done profitably when the Hudson Bay Railway is completed. Then I have no doubt they will prove of great value to the northwestern provinces. From what I could ascertain during my short stay there, the best fishing season would be from the middle of June to August, when the fish are on the coast shores after the migration, and then from September until about October, when the ice sets in. From Churchill south to James bay, most of that coast is fringed with long and low muddy flats, strewn over more or less with small boulders, these extend several miles from shore in most places. There are practically no harbours even for light draught vessels, if we except the Nelson river. Fishing will therefor have to be prosecuted in light draught boats, that could enter most of the small creeks or rivers at high tide. Drift nets of two or three inch mesh in extension will be found, I think, the most suitable for coast fishing. In the estuaries and rivers fixed floating nets of moderate length, two and a half inch mesh, are the most suitable. Seines are very quick and handy engines for catching fish of all kinds, but they cannot be used except on clear bottoms and where the currents are weak.

During the time I was on the Nelson, especially on my last trip in September, we could easily, had we devoted all our time to it, have taken with our short seine, from eight hundred to a thousand pounds of fish daily. In one single haul we caught 689 whitefish. On the Hayes river, near Fishing island, a haul of 100 fish is frequently made. Even at a moderate price, this would be quite a lucrative business, provided it could be shipped fresh to market, as will be the case in a year or two. Some experiments that we made in salting a few proved very satisfactory. They were equal to the best quality of herring in richness and more delicate in taste. Valuable as these fisheries may be to the Western Provinces, they will be totally eclipsed by another source of revenue and that is in,—

GAME PRESERVES.

I have visited and shot over most of the celebrated game resorts of this continent, the Northwestern States with its famed duck ponds, Lake Champlain in its palmy days, the famous Longue Point and Sorel marshes, seal reef in the St. Lawrence and the Labrador shore with its myriads of birds; but never have I seen anything that could compare to this Hudson bay shore. Geese of various kinds, black and pintail ducks, many species of plovers and the smaller members of this

family, are to be found there in countless thousands. All that low marshy belt of land extending from Churchill to James bay, several hundred miles in length and eight to ten wide, on an average, is nothing but an immense breeding ground. Resting in our canoe at night on the mud flats, waiting for a rising tide, we actually could not sleep owing to the continuous honking of the geese around us. Flocks of several hundreds were constantly rising as we sailed or paddled along. Closer to the shores, in the ponds and marshes in the early mornings, or at night, masses of smaller birds were continuously on the wing. At high water, the grassy ridges near the creeks were lined with immense bunches of pintails, *Dafila acuta* and green winged teal. One single shot in a bunch on the wing would generally be sufficient to keep three hungry men satisfied for two days. A list of all the different birds found in this section is appended to this report. It is to be hoped that proper protection will be given to this immense breeding ground of these birds, and that the government will make a "Game Preserve" of it. In a few years, there is sure to be an influx of sportsmen in that region, and certain points at *proper seasons* could be rented and yield considerable revenue.

Larger game is also to be found in that same region. We saw some caribou and their tracks frequently.

Polar bears are common. We saw as many as five in one day, all going in the same direction. They apparently get on the ice in the northern portion of Hudson bay and drift south with it. Then in July and August, as the case may be, the ice melts and breaks up and they are forced to make the coast line by swimming, and work back north again by following the shore. Along the rivers, or inland, eight or ten miles from the sea shore there are some wooded sections, where black bears appear to be common. We saw some of their tracks occasionally. Not being in want of meat we made no attempt to secure any large game. Our canoe was too much cumbered with our fishing gear and baggage to burden ourselves with such a weight, and there was no sport in wanton killing. In October and later on in the fall and winter, this fringe of wood, a considerable part of which is willow, swarms with ptarmigan. Around Port Nelson several thousand were killed last winter. Like most other good things, this "sportsman's paradise" has its drawbacks. It is difficult of access, walking soft and bad, a nasty coast to travel along either in boats or canoes. Low and marshy camping grounds, with no fuel except drift wood and you can go miles sometimes without finding any. We used to carry a small supply in our canoe as we went along and found it very useful. It is also a wise precaution to select the highest ridges, as being somewhat drier, for a camping place, and also to avoid occasional high tides. These may come without any warning, you may wake up in the night with water all around. They are due to strong northerly winds in the bay, driving and piling up the water on these long mud flats, with no chance for an undertow, consequently the waters rise several feet above their ordinary level, varying with the strength of the gale and state of the moon. If one happens to be obliged to ground on these shoals with a falling tide, it is very risky and unwise to leave the canoe and walk ashore to build or cook a meal. The tide comes in so quickly that it may be impossible to reach the canoe in time. We saw two accidents of this kind, while we were on that coast, and it happened to trappers, and all their kit was lost.

HARBOURS.

As already referred to, there are no harbours or shelter to be had, except for very small boats, between Fort Churchill and the Nelson river, and from there south to the Severn, where a light draught vessel may enter at rising tide, while further south to James bay it appears to be the same low lands and shallow water for miles out. This will practically prevent any fishing being ever done on that coast line with sailing vessels, supposing the fish were there for it. I noticed that the government were

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thoroughly alive to the necessity of having the approaches to that low and dangerous coast rendered safer and that steps had been taken to light the entrance of the Nelson. Although this does not exactly come under the object of my trip to Hudson bay, I would beg to offer the following suggestions and trust they may be of some use to the department.

While I was there I was informed that one pole light was to be placed on the highest portion of the Nelson shoal just off the Stoney river, another on Cape Tatnam. These lights will undoubtedly be of some use, but I do not believe adequate. During the summer season these flats and low marshy shores, are always more or less covered with mist or haze towards night, or early in the morning, which disappears with the rise and heat of the sun, so that many times they would be invisible even at a short distance. It must also be borne in mind, that there still remains outside of these two points several miles of shallow water. In my opinion the only safe way for lighting that route when it will be open for commerce, will be to have two good lightships, with suitable fog alarms placed outside of the above two points. A good position for the Cape Tatnam one, would be about twenty-five miles off that shore. These lightships could be safely wintered at Port Nelson and put in commission early in the season, fully two weeks before any vessel could enter the bay. Under existing conditions the wireless apparatus placed on vessels, is not of much use except to communicate with each other, but on the supposition of their not being able to do that in a case of need, the vessel would be perfectly helpless. It would therefore be important to have two or three stations along the straits, say one at, or near, Port Burwell, one at Erik cove, and possibly one on Coutts island. They would be invaluable aids to the vessels coming in early or going out late in the fall, by giving information of the ice conditions, and under this head I will now give our own observations.

ICE CONDITIONS.

The first ice we observed was near Point Amour and gradually increased in quantity with a few icebergs here and there until we got off Battle harbour, when we met packed ice. We were then about sixty miles off shore. From this last point to Hudson strait, it was apparently one continuous belt of ice, with small patches and lanes of open water here and there on its outer edge. We made an attempt to keep outside of it as much as possible and estimated that we were, at certain points, fully one hundred and seventy-five miles from land. Off Cape Mugford we got within thirty miles of land, and finding the same conditions headed out again for more open water, and kept fifty to sixty miles off until we neared the straits. About half way across the straits we came to open water and from there to Resolution island and further north-east there was apparently no ice. This was on July 31. On August 1 we went over the same course and found no ice again so that we had probably reached the end of that long strip of drift ice coming from the coast north of Hudson strait. In the straits the ice seemed to drift out all the time on the south side, while on the north it was affected more regularly by the tides and moved in and out, but the main direction was in. We observed this by our own drift and that of many icebergs, which moved up the straits as far as Big island. Beyond this point we did not see any bergs, but close in towards the land the influence of the flood was still felt. Near Charles island there was a strong ebb tide when we passed there at 6 p.m., August 8. We judged it was running at about $2\frac{1}{2}$ knots an hour. From Big island inwards, up to near Mansel island, we passed some patches of very heavy ice, much of it dirty, discoloured with mud and stones. At some time during the past winter it had been subject to great pressure near the land, because it was piled up in layers, showing the same discoloration. It was evidently old ice that had been drifting around since the previous year or longer. In Hudson bay itself we met very little ice until we reached about sixty miles from Cape Tatnam. Here there was a patch of small

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broken-up ice of the past winter's formation, with occasionally here and there some heavy pans twenty to thirty feet thick. We were informed later that this patch was over one hundred and fifty miles long. It was not heavy enough to impede any good steamer. From the time we left Resolution island until we reached the western end of the straits, we were mostly on the north side of it, and owing to the prevailing winds being from that direction we escaped much of the heavy ice that was encountered by other vessels that were on the south side. We were never at any time subjected to any pressure that would have damaged any ordinary vessel. All the hard knocks and the little damage that we received was had through reckless sailing and mistakes. We were held up several times, for more or less long spells in the ice, until a change of wind or tide would release us. A large quantity of the ice that we saw along the north side of the straits, was last winter's formation, moving out of the innumerable bays and passages among the islands of that coast. It had never been rafted or subject to pressure because the edges were intact and the snow had not even been disturbed on it. Probably had we been there a week or two earlier it would have been found fast to the land. We were told that sledging with dog teams had been kept up on the bays of the south side until the end of July. All this goes to prove that the season of 1914 was an unusually late one as far as navigation was concerned in Hudson straits. Such conditions I believe will always be found to follow mild and open falls, which release large quantities of heavy ice in the Fox channel and elsewhere. This drifts down and is caught with the fresh formed ice of the winter and finds its way out in the following spring. We saw no field ice at all, perhaps because we were there late, or else it may not have had a chance of forming owing to the strong gales on this large expanse of water, which breaks it up. Strongly built ice patrol boats, fitted with wireless apparatus, would render immense service to shipping, when that route will be opened to commerce. To guard against loss of life and property as much as possible, no vessel should be sent to Hudson bay without a wireless installation, otherwise if wrecked they might be weeks or months before obtaining any assistance, especially if it happened to be in some out of the way place.

All the time I was on the *Burleigh* we did not experience any very heavy gales, much less than I expected in that region. I presume this was due to the late season at which we were there. We had much worse weather in September on our canoe trips, and several frosty nights, but no ice worth mentioning had yet formed up to the time we left (Sept. 27th), and we had only one light snow fall. Going out October 1st we observed considerable patches of fresh snow on the mountains, but none on the low lands.

THE "BURLEIGH."

Although this vessel is probably good, staunch and suitable for navigating these waters, she was far too slow with her auxiliary engine to be adapted for an expedition of the kind we were on. At her best she could do no more than two and a half knots an hour, and more frequently it was only two knots. This was not sufficient to stem the least wind or head sea and consequently it could not be relied upon to any extent. We were thirty-eight days out and it took forty-one days back, nearly three months, or practically the whole season consumed in sailing alone. A steamer of moderate size, capable of steaming eight or nine knots, on low consumption of coal and drawing about nine or ten feet of water, would be the right kind of vessel for such work, if the Department intends to continue these investigations. I am inclined to believe that the most valuable fisheries will be found in the southeastern portion of the bay, which we could not visit for want of time.

I have the honour to be

Your obedient servant,

NAP. A. COMEAU,

Officer in charge "*Burleigh*" Expedition.

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WESTERN COAST LINE.

The whole of the coast line which we visited on the western side of Hudson bay, from the Owl river to near Cape Tatnam, is very low, swampy ground, perfectly level. It is composed of clayey deposits, which have been leveled by the action of the water. The outer ridge near the tide-way is covered with grasses and wild flowers of various kinds, common to that latitude. A little further in towards the land this changes to low scrub, about knee high, mixed here and there with small stunted patches of willow—until about eight to ten miles from the beach, when the timber line is reached. These woods consist for the most part of black spruce, poplar, larch and pussy willow, at first of low stature, but increasing in size as one goes further into the interior, and afford shelter to game and fur bearing animals. Outside of the grassy ridges are extensive mud flats, sprinkled with stones and boulders, that extend from ten to twelve miles out in some places. The larger boulders on these shoals are constantly shifted about by the ice in the spring. During heavy gales large quantities of seaweed, especially of the long leaved round stem variety, *fucus*, are detached in the shallow waters and thrown up in ridges along the beach, where we find them in various stages of decomposition. There is also a great abundance of the common blue mussel, *Mytilus edulis*, which get washed ashore and are to be found all over the inside flats miles from the present tide mark. We have also observed old pieces of driftwood a long way inland which the tides have not been anywhere near for years. The above would indicate that this western shore is gradually extending out each season, from accumulations of deposit carried out by the rivers and thrown up on the beaches by the sea. On the Stoney river we visited the site of what is supposed to have been an old whaling station. This must have been for the white whale fishery only and possibly fur hunting in winter. Traces of the foundation of the two huts, about 15 x 20 feet, are still plainly visible, and also a rendering place where we found old iron hoops and pieces of fire bricks. This site is fully a mile inside of the present estuary of the river. We believe when it was originally built, it must certainly have been placed in a handy and convenient spot for handling their products and was probably close to the estuary of that period. To-day it would be in an extremely awkward position for conducting anything of that kind. Stones show the location of a pier where likely they came alongside with boats but which was too shallow to float my canoe. Marsh Point, at the entrance of the Hayes river, shows the same indications, and has probably lengthened considerably within the past hundred years or so. When the beacon was erected by the Hudson Bay Company we must presume it was placed in the most prominent position on the point, now it is quite a distance back. It shows signs of age and is pretty shaky. The south east corner post is rotten and cut right through about the middle. It is a wonder how it stands the severe gales in that condition. From Marsh Point westward going up along the south shore of the Nelson river for a distance of about ten miles, the shore is covered with a dense growth of rich grasses and hay, sufficient to maintain a large herd of cattle, with plenty of good water at hand.

LIST OF BIRDS OBSERVED OR SHOT BY NAP. A. COMEAU, ON "BUR-
LEIGH" EXPEDITION TO HUDSON BAY, 1914.

1. Pied billed Grebe. *Podilymbus podiceps*. Two seen on the Partridge river, apparently breed there (August 30.)
2. Loon. *Urinator imber*. Seen several times along the west coast and in Hudson strait common.
3. Red throated loon. *Urinator lumme*. Common, seen frequently in straits and bay. I was particularly watchful as regards loons, hoping to see a specimen of the Arctic loon, *U. articus*, but am sorry to say did not come across any. This bird must be rare as I never saw a live one.

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4. Guillemot, Sea pigeon. *Cephus grylle*. Seen all the way up the Labrador coast, many miles from land and in Hudson straits, but saw none on the west coast.
5. Murre. *Uria troile*. An exceedingly abundant bird everywhere from Belle Isle north to Cape Chidleigh and in the Hudson straits, less common as we enter the bay. Have seen hundreds sitting on icebergs or flying near them a hundred miles from land. In a fog, the presence of these birds in any number is a pretty sure indication of the proximity of some ice or bergs. Saw some immense flocks in Hudson straits, and some female birds with small fish in their bills, carrying it to their young when land was fully thirty miles distant.
6. Razor-billed Auk. *Alca torda*. Not very common, a few in Hudson strait, none in bay.
7. Dovekie. *Alle alle*. Seen frequently, especially numerous under the lee of icebergs, they are fond of sitting on them like the murre. Common in the straits, none seen on west shore.
8. Skua or Jaeger. *Stercorarius pomarinus*. Fairly common, from Belle Isle north.
9. Parasitic Jaeger. *S. parasiticus*. A commoner bird than the above. We were aware that these birds were regular pirates and had often watched them robbing the poor Kittywake gull and other larger ones of their hard earned fish, but we never thought they were murderers. This season, while we were on the west coast of Hudson bay, between Churchill and the Nelson, we saw them hunt regularly in pairs, and kill small birds. It was most interesting to see the intelligence they displayed in chasing the birds. As soon as one of them started after its game, the mate would sweep along low, and get under the bird to prevent it from diving into the brush or grass and thus evade pursuit. They would thus continue in company and worry the poor thing, until it was exhausted and fall a prey to one of them, because both did their best to get hold of it. It was not struck by swooping like some hawks do, but caught with the beak and swallowed while on the wing. On one occasion we saw the jaeger go out some distance and sit on the water. We could not see on account of the distance if the bird was disgorged and then torn, but one thing we noticed was that immediately after the bird was captured by one, its mate would leave it alone. We saw no quarrelling for the spoils. Most of the birds chased were of the smaller species of the sand piper family and sparrows.
10. Kittywake. *Rissa tridactyla*. A well known and familiar bird all over the St. Lawrence and Labrador right into Hudson bay. Especially abundant in the entrance of rivers.
11. Ice gull. *Larus glaucus*. A few were seen in the straits, common in the entrance of the Nelson river, and many observed on the way up.
12. Saddle back. *Larus marinus*. Observed in same places, but not so common as glaucus.
14. Herring gull. *Larus argentatus*. A common bird seen during the whole trip in one place or other, but more numerous near the land and mouth of rivers.
15. Ring-billed gull. *Larus delarawensis*. Fairly common along the west coast of bay. Not observed in the strait.
16. Fulmar. *Fulmarus glacialis*. Fairly common from Belle Isle to Resolution island. Not seen in bay.

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17. Common Tern. *Sterna hirundo*. A few seen going up, but only two or three observed in Hudson strait. Other terns were observed but could not be identified.
18. Shearwater. *Puffinus*. These birds were frequently seen, but none were secured and so could not be identified as to species. None in straits or bay.
19. Stormy Petrel. *Procellaria pelagica*. Seen often sometimes quite numerous from Halifax to Hudson strait. None in bay.
20. Merganser. *Merganser americanus*. One female and brood seen on the Nelson river.
21. Common Sheldrake. *Merganser serrator*. Very common near all the rivers, of the western part of Hudson bay. None seen in straits as we were probably too far from land most of the time.
22. Black duck. *Anas obscura*. Common in the marshes and ponds of the west coast, breeds.
23. Green winged teal. *Anas carolinensis*. One of the most abundant birds of the species. Found all over the west shore, wherever there is a small patch of fresh water. Clouds of them near the Partridge and Stoney rivers.
24. Pintail. *Dafila acuta*. The commonest of all the ducks of that region.
25. Golden eye. *Glaucionnetta islandica*. One small bunch seen near Macdonald group of islands, in the straits and a few on the west shore of bay.
26. Old Squaw. *Clangula hyemalis*. We were disappointed seeing so few specimens of this duck. Some were seen in the straits, but very few in the bay, and these were in the estuary of the Nelson.
27. Eider ducks. *Somateria*. One small bunch probably King eider, were seen near Charles island, Hudson straits. Most likely abundant along the land. None observed in bay.
28. American scoter. *Oidemia americana*, *O. fusca* and *O. deglandi*. The three varieties were seen in straits and bay; a sight of these birds in any number is a pretty sure sign of being near land.
29. Snow goose. *Chen hyperborea nivalis*. Two of these birds were seen near the Owl river, (Aug. 28) none seen elsewhere on trip.
30. Canada goose. *Branta canadensis*. Extremely abundant on the shore line and on the shoals. We observed their tracks quite a distance inland, but saw no nests. We happened to spend some hours on the flats at night, on account of the falling tide and their honking in our vicinity was so continuous, as actually to prevent us from sleeping.
31. Brant. *Branta bernicla*. Quite numerous along this western shore and breeds, because we observed some young birds. They are not often seen on land, preferring to feed on the flats, or while swimming some distance out, on floating grasses and roots carried out by the current.
32. Swan. *Olor*. One swan was seen on the wing during a heavy gale, on August 31, near the Partridge river, probably, buccinator.
33. Blue heron. *Ardea herodias*. Seen on the Hayes peninsula and on South Seal creek, not common. 19th August.
34. Sora Rail. *Porzana carolina*. One young bird seen at Marsh point, Hayes river, September 9.

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35. Phalaropes. *Phalaropus hyperboreus* and *P. tricolor*. Were quite common in flocks, in the open water outside the ice belt, from Belle Isle to Hudson strait. In strong winds they were frequently seen under the lee of icebergs, in big flocks. They have a peculiar habit of hovering around the bow, or under the shelter of the sails of a vessel at night, especially on dark nights. They look like bats on the wing and utter a most plaintive and monotonous cry. None seen in Hudson bay.
36. Gray snipe. *Macrorhamphus griseus*. Very abundant in flocks of about twenty or so. All over the marshes, between Churchill and Nelson. Very tame bird there.
37. Sand piper. *Tringa minutilla*. Seen in immense flocks on all the west coast of the bay.
38. Yellow legs. *Totanus melanoleucus* and *T. flavipes*. Both very common birds, in pairs and flocks, easily decoyed, seen only on west shore of bay.
39. Solitary Sand piper. *T. solitarius*. Found along the small creeks and rivers.
40. Bartramian plover. *Bartramia longicauda*. Fairly abundant.
41. Spotted sand piper. *Actitis macularia*. Common along the rivers.
42. Curlew. *Numenius hudsonicus* and *N. borealis*. Both very abundant at one time along the Labrador coast, now getting, for some unknown reason very rare. Some people are inclined to believe that they are exterminated by excessive shooting. If that is the case, it must be during their migration or in their winter haunts, as very few are killed on their breeding grounds. We saw two small flocks and a few stragglers, north of the Nelson.
43. Ox-eye plover. *Charadrius squatarola*. Common, in flocks.
44. Golden plover. *C. apricarius*. Common, but never seen in large numbers.
45. Killdeer plover. *Aegialitis vocifera*. A few seen in small bunches.
46. Ring plover. *A. hiaticula*. Seen here and there, but not abundant.
47. Ptarmigan. *Lagopus lagopus*. Saw abundant traces of their passage in the way of droppings and feathers, in the willow patches but saw none of the birds. They were killed in hundreds at Port Nelson last winter 1913 and 1914.
48. Marsh hawk. *Circus hudsonius*. A common bird along the marshy beaches.
49. Coopers hawk. *Accipiter cooperii*. Shot one that had lit on the ridge pole of our tent. It had been attracted by a small bunch of plover and teal that was hanging on the end of it. South side of Nelson.
50. Rough legged hawk. *Archibuteo lagopus*. Seen occasionally.
51. Golden eagle. *Aquila chrysaetos*. Some of these birds were seen several times around the west coast of bay.
52. Gyr falcon. *Falco islandicus*. Found a dead specimen of this bird along the banks of North Seal creek, it had been shot and wounded and afterwards perished, it had lain there for some months.
53. Sparrow hawk. *Falco sparverius*. Frequently seen.
54. Osprey. *Pandion haliaetus*. Several seen on the rivers and coast Hudson bay.
55. Barred owl. *Syrnium*. A very large specimen of this family, probably, *cene-reum*, was flushed in the woods near Deer island, Nelson.
56. Horned owl. *Bubo virginianus*. Was heard several times along the Nelson river.

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57. Black backed wood pecker. *Picoides arcticus*. Observed several times.
58. Night hawk. *Chordeilus virginianus*. Common on the barren heights along the Nelson river and around Port Nelson and Hayes river.
59. Horned lark. *Otocoris alpestris*. Seen around Nelson and along the grassy beaches, not numerous.
60. Canada jay. *Perisoreus canadensis*. Common along the shores of the rivers and coast wherever there are any trees.
61. Northern raven. *Corvus corax, principalis*. A very common bird and considered a great pest by the trappers, who lose no chance of shooting them whenever possible.
62. Common crow. *Corvus americanus*. Seen often but not abundant.
63. Black bird. *Scolecophagus carolinus*. Quite common in flocks about the west coast of bay.
64. Red poll. *Acanthis linaria*. Common in flocks, frequently chased by the jaegers.
65. Savanna sparrow. *Ammodramus savanna*. One of the commonest sparrows seen.
66. Swamp sparrow. *Melospiza georgiana*. Observed in the low brushes and swampy regions near the rivers.
67. Chickadee. *Parus hudsonicus*. Observed only in the wooded portions up the Nelson river.
68. Hermit thrush. *Turdus pallasii*. Heard and seen along the rivers, in wooded sections.

Various smaller species of owls were seen, some hawks, many small birds of which we only got a glimpse or saw at too great a distance to identify them. The special work I was on, did not warrant my losing any time in their pursuit. These notes were taken simply because we take an interest in bird life and it may interest others.

NAP. A. COMEAU,

Officer in charge, "Burleigh" Expedition to Hudson Bay, 1914.

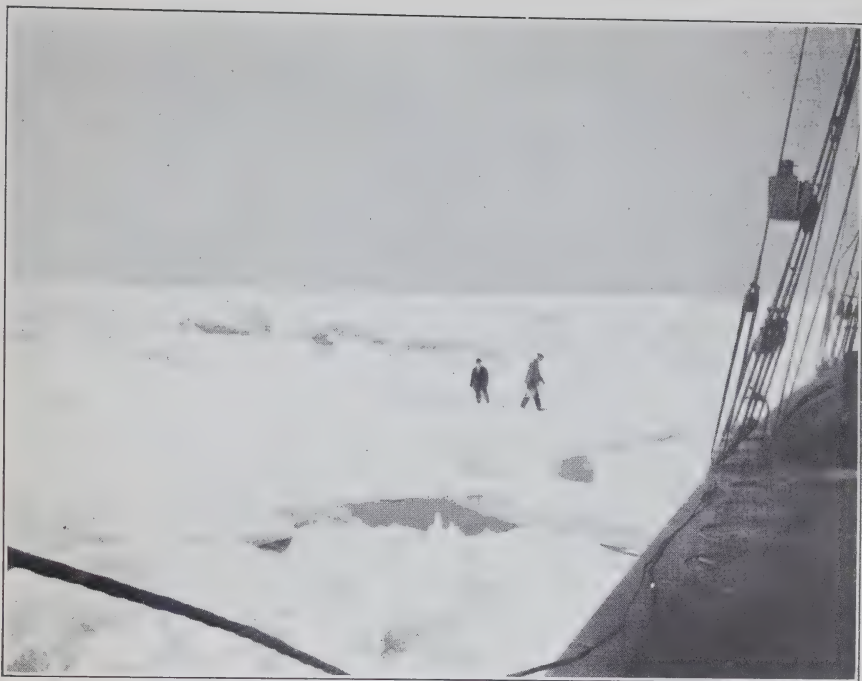
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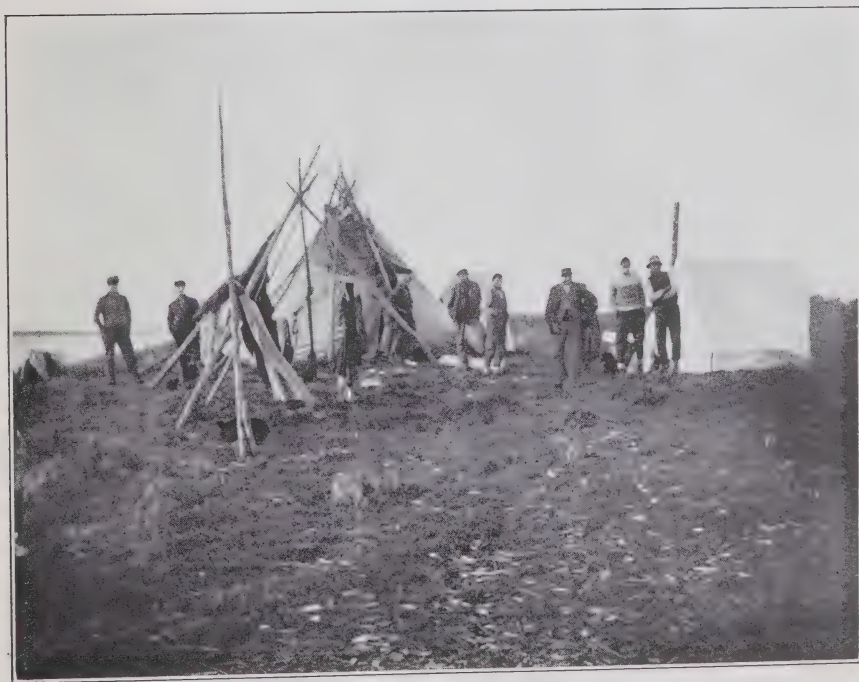
Beset in the Ice, Hudson Strait, August 7, 1914.



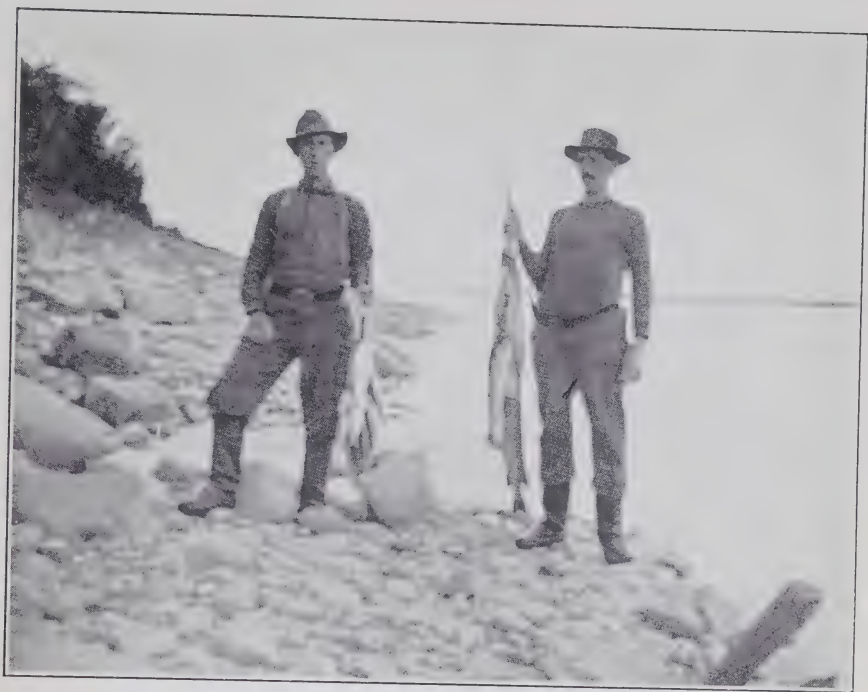
York Factory.



Seining on the Nelson.



A Cree Camp, Hayes River.



Some of our Catch.



Five and a half pound Trout, N. Sacol Creek.



